RISK COPING, SOCIAL NETWORKS AND INVESTMENT IN RURAL GHANA

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Thomas Frederick Walker

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Thomas Frederick Walker, Ph. D.

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This dissertation explores how informal social institutions and social networks affect investment and consumption decisions in Ghanaian villages. While informal institutions create opportunities for risk sharing, they may distort individuals' incentives to invest in public and private goods. I examine this issue using data from a year-long household survey and two field experiments conducted in 2009 in four small communities in Akwapim South District, a rural area in southern Ghana.

The first paper presents the results of a field experiment measuring the willingness of individuals in rural communities to contribute to the financing of local public projects. The experiment tested two techniques to encourage contributions: a matching grant, and a provision point mechanism, both of which were found to be effective. Using detailed survey data on participants and their social networks, I examine what characteristics explain individuals' contribution decisions. I find that individuals who are more trusted by their peers contributed significantly more, but this result is not explained by status alone. On the contrary, new migrants to the community and individuals from minority ethnic groups donated more than individuals from the local ethnic group and those with a longer history in the community.

Unlike its formal counterpart, informal insurance may actually limit individual initiative. Like an income tax, social obligations erode an individual's enjoyment of the returns from an investment, and may thereby distort their incentives to invest. The extent to which this taxation discourages risk-taking, entrepreneurship and investment is hitherto not well understood. In the second paper I use a field experiment to measure how social obligations to share resources affect the consumption, transfer and investment behavior of individuals in rural Ghana. I develop a theoretical model linking the characteristics of a household's social network to its decisions

about investment and consumption. I then test the model using the results of a field experiment in which large prizes of cash and animals were allocated by lottery to randomly selected respondents. The results suggest the presence of an ‘investment trap’, whereby richer individuals are discouraged from making profitable investments because of the likely social taxation of gains from those investments.

BIOGRAPHICAL SKETCH

Born in London, Thomas grew up in Canberra and Sydney, Australia. He studied economics at the University of New South Wales (UNSW) and graduated in 2003 with a Bachelor of Economics (Hons I). While completing his undergraduate studies, Thomas worked as a research assistant at UNSW and at The World Bank. He conducted anthropology fieldwork in Samoa, and assisted with a survey of schools in Papua New Guinea. Thomas joined the Reserve Bank of Australia as a cadet in 2001. After graduation, Thomas worked at the Reserve Bank for 3½ years, first in the Economic Research Department (maintaining the Department's macroeconomic forecasting model and conducting research on inflation modeling, business cycles and forecasting), and then in the Economic Analysis Department (monitoring and researching the European economies). In 2006, Thomas moved to Ithaca, New York, to commence his doctoral studies at Cornell. As a research assistant at Cornell, Thomas collaborated on a study of the effect of household shocks on schooling attendance in Madagascar. He spent 2009 in Ghana conducting surveys and experiments for this dissertation. In 2010, Thomas spent a year at the Australian National University as a visiting scholar and tutor.

For Meg,
my companion on this journey.

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All statements and errors in what follows are my own.

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CHAPTER ONE

Risk Coping and Social Institutions in the Developing World

The New Institutional Economics emphasizes the importance of institutions to development. Many of the failures of development initiatives can be traced to weak or missing formal institutions, a weak state and legal system, and high transaction costs (Lin and Nugent, 1995). In light of these failures, people in developing countries rely to a great extent on others in their family and community for services such as investment loans, insurance against negative shocks, and old age support. These informal institutions bridge the gaps in the formal economic system. In this dissertation I explore the ways in which informal social institutions and social networks affect investment and consumption decisions in rural Ghanaian villages. I make use of data from a year-long household survey and two field experiments conducted in four small communities in Akwapim South District, a rural area in southern Ghana.

Informal institutions can both enable and impede the process of investment and innovation necessary for development. In rural communities, informal institutions create opportunities for exchange, commercial transactions and risk sharing. Being more receptive to the interests of local communities, and having more influence over them, local councils, chieftaincies, secular and religious groups can make valuable contributions to the design and implementation of public investment projects, even in the presence of a well-functioning central state. The concept of community-driven development recognizes these advantages of local information and interest. During 2009, we conducted an experiment in the survey villages to elicit contributions from community members toward the cost of a real public good. In the first paper of the dissertation, I

examine how individuals' positions in the social network, and other characteristics, affect the amount they were willing to contribute. I also test two mechanisms designed to help overcome the free-rider effect, whereby individual contributions to a public good are typically lower than individual private valuations of that good.

Empirical evidence suggests that informal institutions provide extensive support to the poor and are central to the economic life of traditional rural communities. However, these institutions do not fully replace formal government and market-based services. Researchers have begun to explore how the structure of social networks may shape individual and group outcomes, introducing asymmetries and inequalities within and among groups. Informal institutions are limited in scope by geography, since diversification of risk and diffusion of credit can only spread as far as the network that carries it. In addition, their benefits are limited to network members, potentially excluding community members of different ethnicity, gender or other attributes.

Unlike its formal counterpart, informal insurance may actually limit individual initiative. Similar to an income tax, social obligations erode an individual's enjoyment of the returns from investment, and may thereby distort their incentives to invest time, effort and capital in productive activities. Thus the social support provided by the community may be a double-edged sword, protecting individuals against shocks in bad times, but taxing them in good times. The extent to which this taxation discourages risk-taking, entrepreneurship and investment is hitherto not well understood. The second paper of the dissertation presents, and then tests, a model of the social taxation of investment in a social network context, showing how incentives to invest may vary across the network depending on individuals' relative wealth.

In the remainder of the introduction, I outline in detail the extant literature on individual

risk coping strategies. The ways in which individuals deal with shocks to their own consumption and income, and share resources with others to mutually insure each other, are at the heart of an exchange system that binds rural communities and defines the social network. That discussion provides the intellectual basis from which individual obligations to the community can be understood, and from which individual decisions to invest – in both public and private goods – can be examined.

1.1 The rationale for risk coping mechanisms in developing countries

Individuals in developing countries face a variety of risks and shocks. Fluctuations in climatic conditions, pest infestations and disease outbreaks affect the income derived from commercial farming, the prices of food and business inputs, and the quality of food available. Geopolitical risks threaten individuals' lives, and also the viability of their businesses and farms.[1] Individuals who own or work in small business are also prone to price shocks and changes in government policy. Given the cyclical nature of agricultural production, people in rural areas are particularly exposed to fluctuations in income and living standards. During the sowing season, when expenditure on farm inputs and labor is at its highest, the agricultural income stream is typically at its ebb. Stocks of stored food and cash are at their lowest, and individuals are therefore at greatest risk of being unable to cope should they be hit by a negative shock such as illness, death or bad weather.

Market failures endemic in developing countries tend to increase the prevalence of shocks and magnify their effect. The products offered by formal institutions such as banks and insurers are inaccessible to many in developing countries. Programs directed at those excluded from the

[1] The risks to life and property posed by civil unrest or conflict are of particular concern in sub-Saharan Africa, and are the subject of a distinct literature. They will not be explored in detail in this summary. For a recent review of the literature on this topic, see Blattman and Miguel (2010).

formal system (mainly rural households and the urban poor) are typically limited in scope and may themselves be affected by widespread regional shocks. Meanwhile, the absence or poor enforcement of legal contracts creates opportunities for deception and misconduct in business relationships, resulting in high rates of default on contractual obligations (Fafchamps, 2003, p. 10). This reduces the general level of trust in exchange and social interactions. Geographical limitations imposed by poor road, rail, sea and air infrastructure cause transaction costs to rise steeply with distance and isolation, excluding people in remote areas from economic opportunities elsewhere and creating large disparities in prices across space. These disparities cause segmentation in markets for products like livestock, enhancing the price fluctuations resulting from negative events such as droughts, and thereby removing one potential means of mitigating shocks: the sale of productive assets.

Individuals who live in or near extreme poverty are at particular risk from such shocks, facing a real possibility of starvation or serious illness as a result of a fall in consumption. The short-term consequences of severe shocks to survival are clear, yet periods of extremely low consumption also pose significant threats to individuals' welfare in the medium and long term. Extended periods of malnutrition can have a long-lasting impact on the physical and mental ability of individuals, affecting their future income earnings capacity and productivity (Fafchamps and Quisumbing, 1999). They also have significant implications for the survival and human capital accumulation of children (Jensen, 2000). Economic shocks affecting pregnant women have been found to reduce babies' birthweights, and in turn their chances of survival to adulthood (Rose, 1999). Hunger during infancy and childhood can lead to stunting, wasting and cognitive impairment, diminishing life expectancy and earnings capacity. Alderman et al. (2006) found that malnutrition among children in Zimbabwe delayed subsequent school entry and

reduced grade attainment. There is also evidence that children may be taken out of school in response to negative shocks like parental illness or death, either for short periods (Jacoby and Skoufias, 1997) or permanently (Thomas et al., 2004; Glick et al., 2011). Individuals with lower levels of human capital are more likely to remain in poverty, increasing their vulnerability to future shocks and thereby imperiling the lifetime earnings trajectory of their own children. There is also evidence that the health impact of shocks in some parts of the world is disparately borne by women, which in turn has implications for their children's health. Rose (1999) found in India that young girls were more likely than young boys to die during periods of drought, and Hoddinott (2006) observed in Zimbabwe that women's body mass indices – but not men's – fell during a drought in 1994-95. While shocks lead directly to diminished income and capital in the short run, even the *risk* of shocks can have a negative impact on development, by inducing individuals to adopt less profitable (and more risk-averse) investment strategies. Rosenzweig and Binswanger (1993) found that the uninsurable component of weather risk decreased the efficiency of investment and level of income among Indian farmers. The effect of this risk aversion on income can be substantial: farm profits were 35 percent lower among farmers in the lowest income quartile.

For these reasons, individuals in developing countries have good reason to seek ways in which to manage risk, both by reducing the frequency and magnitude of shocks, and by insulating themselves from the effects of such shocks on their welfare. Given the importance of shocks to outcomes among the poor, and as a consequence their survival, health and future income earnings capacity, risk coping is also of significant importance to development economics.

In what follows, I will make a distinction between two types of strategy taken to cope with

risk and uncertainty in rural communities. Strategies designed to reduce the prevalence and size of shocks will be referred to as *risk reduction* strategies, and include behavior such as diversifying income sources, avoiding risky investments or crops, and migrating. This literature is broad but not directly related to this dissertation, and therefore is not discussed further in this chapter. Strategies aimed at mitigating shocks once they occur are often referred to as *risk coping* strategies, and include a wide range of methods of smoothing income, assets and consumption, through the use of savings, inter-household transfers and the sale of assets. While it has been common in the past for researchers to focus on the ability of the poor to smooth consumption (that being the best proxy of individuals' welfare), consumption smoothing is not always the primary objective of the poor. Some shocks, such as health expenses, affect non-discretionary spending (Gertler and Gruber, 2002). Thus the poor may wish (or be compelled) explicitly to *destabilize* their consumption at times, in order to maintain their health and standard of living. The literature on risk coping strategies discussed below is therefore necessarily broader than simply that on consumption smoothing.[2]

1.2 The theory of risk coping strategies

The theoretical and empirical literature identifies two broad categories of risk coping strategy. The first is a strategy of self-reliance: using stocks of assets (liquid or illiquid) and credit (if available) to cope with unexpected drops in income or rises in nondiscretionary consumption. The second is a strategy of mutual reliance: sharing risk between households through unrequited transfers, flexible loans or remittances. This is often referred to as 'informal

[2] Fafchamps (2003), pp. 12-13, likewise balks at the use of the term 'smoothing', but is even more agnostic about the labels applied to these two types of strategy. That said, he does not definitively label them. The issue is semantic and debated, but Fafchamps is correct in noting that the over-use of terms like 'smoothing' can be misleading and unnecessarily restrictive.

insurance'. In this section, I will describe the theoretical literature related to each strategy in turn.

1.2.1 Strategies of self-reliance: Buffer stock savings

It is well known that households in rural areas of developing countries are often at least partially credit constrained, able at most to borrow money at an interest rate many times higher than the interbank rate. In practice, therefore, economists have tended to assume these households are fully credit constrained, capable of spending only as much as they hold at any point in time. Deaton (1991) presents a dynamic programming model of the problem faced by a risk-averse individual who is credit constrained. In keeping with the permanent income hypothesis, the individual seeks to smooth consumption over time by equating her expected marginal utilities of consumption in every period over the planning horizon. However, she is subject to a nonnegative cash-on-hand (assets plus income) constraint, so that when the stock of cash-on-hand falls below a certain level, her only recourse is to consume it all. Deaton's model describes the use of asset holdings as a 'buffer stock', whereby surplus resources are stored to buffer consumption against anticipated shocks in the future. This framework was extended by Carroll (1997), who showed that such a strategy was optimal even when abstracting from credit constraints, provided individuals are sufficiently impatient and sufficiently prudent (that is, inclined to hold precautionary savings). A more detailed discussion of Deaton's buffer stock model is provided in Section 3.2 of Chapter 3.

While the buffer stock savings strategy is equally effective in smoothing both idiosyncratic and locally covariate shocks to income (the latter being instances in which nearby friends and relatives may be unable to provide help), its main drawback is that the buffer stock is finite. A sufficiently long sequence of negative income draws depletes savings and leaves the individual

with no alternative but to fully absorb a negative income shock through reduced consumption. It is thus a strategy that exposes individuals to potentially catastrophic risk, especially where income is serially correlated over time.

The success of a buffer stock savings strategy relies in part on the form in which savings are held. The rural poor may not have access to reliable bank accounts, and may not be able to convert their wealth into cash, gold or jewelry. These assets may also be perceived as too risky in areas where theft, violence or spousal control is prevalent. Liquid, non-cash assets like grain and foodstuffs are subject to a high rate of depreciation, because of pests, weathering and aging, and thereby bear a negative rate of return. Such assets may also be visible, and therefore prone to claims from others, further diminishing the stock over time. A buffer stock saving strategy based on these forms of wealth may accordingly be less effective in the medium-to-long term. The most popular non-cash store of liquid wealth in India is livestock, given its durability and potential positive rate of return (Rosenzweig and Wolpin, 1993; Rosenzweig, 2001). Livestock also accounts for more than half of the value of assets held by farmers in Burkina Faso (Fafchamps et al., 1998), and comprises almost all of the assets held by pastoralists in southern Ethiopia (Lybbert et al., 2004). This asset is also more easily 'titled', and consumption is lumpy and irreversible, so claims on the asset by others can be evaded more easily than those on divisible goods like grain. However, livestock are prone to heavy losses from drought and disease (McPeak and Barrett, 2001), and to adverse price fluctuations caused by covariate shocks, eroding the real value of buffer stock assets at the point when they are most needed (Fafchamps et al., 1998).

Zimmerman and Carter (2003) show how the procyclicality of asset prices can lead individuals to prefer to smooth their asset stocks at the cost of greater consumption volatility.

They illustrate how a buffer stock savings strategy, coupled with endogenous prices, can thereby cause asset allocations across individuals to bifurcate, resulting in the evolution of large wealth disparities over time. The poor cannot afford to hold illiquid, productive assets, because of their need for a liquid buffer stock. The rich can buffer their consumption sufficiently with income to be able to hold less liquid and more productive assets like land. Ironically, the poor cannot even 'afford' to sell their assets in the event of a common shock, because such shocks generally drive down asset prices. As a result, they adopt a less remunerative asset accumulation strategy but suffer *greater* volatility in their consumption (relative to the mean) as a result of common shocks.

As opposed to systems of mutual assistance (discussed in the next section), buffer stock savings allow individuals to be self-sufficient, and have the potential to smooth common shocks where mutual assistance cannot. However, because of the typically high rates of depreciation of non-cash liquid assets, the strategy cannot be relied upon for savings over long periods of time. Repeated negative shocks deplete the buffer stock and leave households completely exposed to further negative shocks, and asset price movements in response to common shocks may drastically reduce the real value of a buffer stock for coping with income shortfalls. For these reasons, a buffer stock savings strategy cannot alone suffice as a complete risk coping system.

1.2.2 Strategies of mutual reliance: Informal insurance

Individuals can cope with unanticipated shocks by seeking assistance from others.[3] To the extent that shocks are not perfectly correlated across individuals, it is ex-ante welfare maximizing for individuals to contract among themselves to smooth consumption across states

[3] Assistance can take the form of gifts of cash or goods in kind, but in some settings arrangements involving loans with flexible repayment or debt forgiveness are more common, as discussed below.

by making transfers of cash or goods in kind. A prerequisite of such arrangements is that participants must expect to receive assistance with sufficient frequency to offset the cost of helping others. Other considerations, such as coercion, altruism or status display, may defray the cost of assisting others and thereby relax this constraint.

At the heart of the informal insurance arrangement is a tension between diversification of the insurance pool and enforceability of the contract. As in all insurance arrangements, the system works best when the pool of participants is well distributed across space, or derives income from diverse sources. If the insurance pool is concentrated, the shocks faced by individuals will be highly correlated and shocks will more frequently be common to all individuals. Concentration thus diminishes the effectiveness of informal insurance. On the other hand, greater geographic concentration of participants increases the chance of repeated interactions between parties, providing the leverage necessary to oblige members to give. Counterparties in small communities are more capable of observing each other and gathering information to verify the needs of claimants. The effectiveness of informal insurance arrangements is therefore intrinsically bound to the structure of the social network, the cohesion of the insurance group and its geographic distribution. Enforcement of obligations, through norms, economic interdependence, or the prospect of future interactions, is central to the sustainability of informal insurance.

Kimball (1988) and Coate and Ravallion (1993) characterize the Pareto optimal transfer arrangement between two or more parties seeking to smooth their consumption. The precise model is described in Section 3.2 of Chapter 3. Given the informality of the contract, these arrangements rely on the repeated nature of the game to deter defection. Both Kimball (1988) and Coate and Ravallion (1993) identify the importance of the participation constraint to the

sustainability of informal insurance arrangements. Individuals must always expect to gain more in future expected utility from being part of the arrangement than they would from 'defecting'. There may be states in which an obligation to transfer would trigger defection; such states will be excluded from any feasible ex-ante contract. This provides a theoretical basis to expect that informal insurance will not be complete in any real-world society; there will always be a 'deductible' to guard against moral hazard and guarantee participation.[4]

Subsequent refinements of the Coate–Ravallion model have gone further in stressing the imperfections of informal insurance in the real world. Mirroring the literature on finance (see, for example, Hosios and Peters, 1989), researchers have in particular focused on the problem of limited commitment: payments are staggered across time, so that a donor now is only compensated by the prospect of being a beneficiary in the future. He is therefore exposed to the risk that the current beneficiary defaults on her obligation at an intermediate date. The standard solution to this problem in finance is to provide collateral for the loan, but in rural villages individuals are often credit constrained precisely *because* they lack collateral. Instead, as Ligon et al. (2002) observe, individuals pledge their reputations and future economic wellbeing in the community as collateral. Social sanctions are threatened, and possibly imposed, in response to a breach of the informal insurance contract. This serves to broaden the set of states in which the contract applies, and thereby expand the scope for insurance. The risk of moral hazard also serves to undermine the effectiveness of informal insurance. Default may be caused by genuine misfortune, but given the inability of agents to fully observe each other's financial state and effort, there are substantial incentives for individuals to falsely understate their incomes or invest a lower level of effort. Ligon (1998) shows that in order to discourage this behavior, contracts

[4] Indeed, as will be discussed in Section 1.3.2, the empirical evidence shows almost unequivocally that gifts and loans cannot fully insure individuals even against idiosyncratic shocks to income; typically, the degree of insurance is very limited.

must offer a higher level of utility for good outcomes than for bad ones. Accordingly, insurance cannot be complete even for the set of insurable states.

The emphasis hitherto on enforcement should not suggest that the decision to assist others is always made grudgingly. Transfers are most often observed between family and friends, in part because of a feeling of affinity and kinship. Even unrelated individuals may assist each other because of altruism or a 'warm glow' feeling from helping (referred to as 'impure altruism' by Andreoni, 1990). Foster and Rosenzweig (2001) present and test a model in which individuals can be either altruistic or selfish, but face limited commitment in a risk-sharing contract. They find that limited commitment constrains transfers, but altruism relaxes these constraints and thus increases the gains from income pooling.

Since the collateral value of social capital is likely to be higher, ceteris paribus, among individuals in a small community or common social network, the literature has made an effort to examine how the structure of the social network defines the scope for informal insurance, and how social exclusion can translate into underinsurance (Fafchamps and Gubert, 2007a; Krishnan and Sciubba, 2009). The empirical evidence discussed below suggests that the degree of support does vary widely even within small communities, and can be segmented along ethnic lines (Grimard, 1997).

On a related note, Platteau (1997, 2009) has described in detail the role of social norms – and the threat of social sanctions – in governing informal insurance arrangements across a range of developing countries. Obligations are enforced within the network, sustaining informal insurance contracts across a broader range of states than would be feasible without them. Since families sometimes have difficulty enforcing punishments (particularly where bargaining power is asymmetric), village-wide social norms institutionalize and coordinate punishment for

deviations (Platteau, 2006). Punishment by the community as a whole is more damaging (and therefore more effective) than punishment simply by the wronged party. However, social norms are a blunt instrument that may have unintended consequences. Platteau (2009) identifies how obligations to share windfalls with others may discourage investment and initiative, with emigration and separation possibly the only means by which the successful and ambitious can escape these obligations and accumulate significant wealth. This echoes the hypothesis of Banerjee and Newman (1998) that only the very poor and the very rich in developing countries can 'afford' to migrate to urban areas; those in the middle rely on support from the informal village network and are to some extent 'trapped' there by it (Morduch, 1999, p.10).

1.3 Empirical evidence on risk coping strategies

Reflecting its importance to development, an expansive body of empirical research has studied the ability of individuals in developing countries to cope with risk. In this section I will describe the evidence on buffer stock savings and informal insurance, before discussing the evidence on the role of the social network and the crowding out hypothesis. A detailed survey of the literature on buffer stock savings is given by Rosenzweig (2001). For surveys of the literature on informal insurance, see Alderman and Paxson (1994), Besley (1995), Morduch (1999) and Platteau (2006). For a general summary of community-based risk management, see Bhattamishra and Barrett (2010).

1.3.1 Buffer stock savings and consumption smoothing

Individuals in developing countries face the combination of low mean income, higher income volatility, and a lack of formal credit markets (Rosenzweig, 2001). In addition to the high

intra-year fluctuations in income experienced by individuals dependent on agriculture, Rosenzweig and Binswanger (1993) find that over a ten-year period, the coefficient of variation of income was 2.5 times higher among Indian households than among comparable households in the United States. Accordingly, risk-averse individuals in developing countries have a strong incentive to use assets to smooth short-term shocks to income. Studies using the ICRISAT data from semiarid India have found that land and buildings account for approximately 85 percent of the total assets held by farming households, but land and buildings are rarely liquidated and cannot be considered a buffer stock. Indeed, in many communities land sales are prohibited or discouraged, since distress selling induces self-reinforcing inequalities in the society (Fafchamps, 2003, p. 22; Zimmerman and Carter, 2003; Platteau, 2006). Livestock is the most commonly-held productive asset that can be liquidated (Rosenzweig, 2001, p. 46). As discussed below, however, individuals often prefer to destabilize consumption rather than sacrifice these productive assets, a behavior referred to as 'asset smoothing'. For this reason, individuals engage in precautionary saving by holding stocks of liquid assets such as jewelry, cloth and food, and bank accounts if they are available (Behrman et al., 1997; Lim and Townsend, 1998), that can be liquidated to offset income shortfalls. Other methods include switching labor between different employments (Kochar, 1999; Imai, 2003), debt peonage (selling future labor for credit) and voluntary enslavement (Fafchamps, 2003, p. 23-4).

Early studies attempted to gauge individuals' ability to smooth consumption in response to shocks to income. This was achieved by regressing consumption on income, suitably decomposed into permanent and transitory components using instrumental variables techniques. By the permanent income hypothesis (Hall, 1978), it is rational for a risk-averse individual to adjust consumption only in response to innovations in permanent income, and to save or dissave

to offset transitory shocks to income. Early tests of this hypothesis used rainfall or similar instruments to proxy for transitory income shocks. Wolpin (1982), Paxson (1992) and Townsend (1994) could not reject the hypothesis that individuals were able to fully insulate consumption from idiosyncratic shocks using savings or transfers. However, these studies were unable to identify *how* consumption was smoothed. Rosenzweig and Wolpin (1993) attempted to address this deficiency by estimating a structural model of buffer stock saving on data from semi-arid India, treating bullocks as the storage asset. They noted that bullock sales increased during times of low rainfall and that purchases increased during times of high rainfall.

A second wave of studies challenged the accuracy of Rosenzweig and Wolpin's estimates, given the difficulty of accurately separating permanent from transitory shocks, and the prevalence of measurement error in income data from household surveys. Using different techniques, they found that the ability of individuals to smooth income shocks was not perfect. Ravallion and Chaudhuri (1997) revisited the ICRISAT data used by Rosenzweig and Wolpin (1993) and were able to reject the null hypothesis of consumption smoothing. Morduch (1991), Lim and Townsend (1998) and Ligon et al. (2002) also found little evidence of consumption smoothing in the ICRISAT data. Meanwhile, Deaton (1997) and Grimard (1997) were able to reject the null hypothesis of perfect consumption smoothing in data from Côte d'Ivoire. Townsend (1995) found mixed evidence of risk sharing in data from Thai villages. Jalan and Ravallion (1999) estimated that Chinese households could insure consumption against 60 percent of an income shock, but that this ability varied with wealth (such that wealthier households were able to fully insure consumption against shocks). Dercon and Krishnan (2000) found similar evidence in Ethiopia, and Morduch (2005) found that individuals in south India with more land were more capable of smoothing consumption.

As discussed in Section 1.2.1, buffer stock savings strategies are more effective at smoothing volatilities in income over the short run than over the long run. The most severe shocks in rural areas are those related to weather, and extremes (such as drought and flood) commonly persist for more than one growing season. Under these conditions, individuals may deplete their buffer stock quickly and be fully exposed to shocks in subsequent periods. Deaton (1992) uses simulations to show that the usefulness of buffer stocks depends critically on the degree to which income innovations are correlated over time. Alderman (1996) finds supporting evidence of this in data from Pakistan. Shocks that are highly correlated across space may also undermine the effectiveness of the buffer stock savings strategy. During extreme weather events, a spate of distress selling will drive down the price of assets relative to the price of consumables, thereby eroding the real value of the buffer stock. Lim and Townsend (1998) argue that a strategy of selling bullocks during drought actually adds volatility to consumption, and find little evidence to support the claims of Rosenzweig and Wolpin (1993) that households in semiarid India sell bullocks to offset the effects of common shocks. Fafchamps et al. (1998) found that among households in Burkina Faso, selling livestock offset only 15-30 percent of the income shortfalls associated with drought. The geographic extent of the shock, and the segmentation or rigidity of markets (for example, due to high transaction costs) diminish the attractiveness of asset sales as a consumption smoothing method. Kazianga and Udry (2006) studied a prolonged and severe drought in Burkina Faso in the early 1980s. They found little evidence of distress selling of livestock among affected households, and almost no risk sharing. Similarly, Verpoorten (2009) found that households in Rwanda refrained from selling livestock during that country's civil war in 1994 because of plummeting prices. Indeed, there is evidence that households afflicted by covariate shocks of this type actually choose to destabilize consumption

in order to conserve their productive asset stocks (Barrett et al., 2006; Kazianga and Udry, 2006).

Individuals' efforts to cope with risk may also have long-run costs and distort their incentives to take risks and make investments that would otherwise be optimal. Using data from India, Walker and Ryan (1990) estimated that individuals sacrificed 25 percent of their income in order to offset risk. Rosenzweig and Wolpin (1993) found that farmers in India were discouraged from holding the optimal number of bullocks because of risk aversion and high income volatility. A nascent literature has begun to examine the effect of risk on individuals' capacity to take risks in adopting new technologies and growing new crops (Goldstein, 2000; Goldstein and Udry, 2008; Conley and Udry, 2010). Accordingly, safety nets can on average increase people's welfare (Platteau, 1991), and may also free them to invest their limited assets in more productive uses than precautionary savings.

1.3.2 Informal insurance

A number of studies have established that idiosyncratic risk dominates covariate risk in developing countries (Townsend, 1995; Deaton, 1997; Lybbert et al., 2004; Kazianga and Udry, 2006). Thus there appears to be substantial scope for informal insurance to reduce the impact of shocks. Indeed, risk-sharing arrangements are prevalent in traditional societies. The exact nature of arrangements varies across societies, and sometimes even across villages (Townsend, 1995), depending on local economic circumstances, village size, religion and political situation. Transfers of wealth can take forms as diverse as gifts, remittances, loans with flexible repayment schemes, and bridewealth payments. Typically the arrangement is heavily embedded in local tradition and social norms, enforced by notions of mutual solidarity (Scott, 1976; Fafchamps, 2003) and subject to sanction and other enforcement techniques (Platteau, 2006). The norms

sustaining these arrangements have been linked to the precariousness of life in traditional societies (Scott, 1976; Posner, 1980; Kimball, 1988; Platteau, 1991; Coate and Ravallion, 1993), and the concept of the village as intrinsically linked to its environment and at the whim of nature (Platteau, 2006, pp. 194-5). Some arrangements are completely informal and uncontracted, taking the form simply of a norm to be generous, while others (such as the fishing co-operatives studied by Platteau and Abraham, 1987) are formal arrangements subject to strict codes.

Arrangements may be based on an expectation of mutual exchange, whereby each party expects to be assisted at some point in the foreseeable future, or take a patron–client form, whereby a risk-neutral benefactor provides assistance in virtually all states. In the latter sort of arrangement, the patron extracts compensation from the client in some alternative form, such as political support or labor, possibly on exploitative terms (Fafchamps, 1992; Fafchamps, 2003, pp. 47-51). Arrangements between individuals with different levels of wealth or ability may be sustained by benefits deriving from social esteem (Platteau and Seki, 2007). Another possibility is that transfers are selfishly motivated by members of a group who depend on each other for security against an external threat. According to this view, the survival of one's neighbors is essentially a public good. In their study of pastoralists in the east African rangelands, Huysentruyt et al. (2009) argue that the threat of encroachment by, or conflict with, neighboring tribes encourages nomadic herders to invest in each other's welfare as a means of sustaining 'safety in numbers'. This redistribution may also be progressive, to the extent that the poor are more likely to leave the group if they cannot sustain themselves.

Some of the earliest evidence on the effectiveness of transfers to offset shocks came from Lucas and Stark (1985), who found that remittances from friends and relatives overseas responded to shocks to the recipient's income. However, access to remittances (which are

uncorrelated with almost all shocks faced by a rural household) varies greatly across individuals even within one village, and is typically increasing in wealth and education. Migration may be induced specifically with a view to diversifying income sources (Paulson, 1994; Foster and Rosenzweig, 2002). The majority of studies have thus since focused on intra-village transfers as well, and concluded that transfers in general do not fully insure households against shocks to income. In the Philippines, Fafchamps and Lund (2003) find that transfers among villagers fail to efficiently share risk at the village level. They argue that since transfers are observed to flow between friends and family members, the nonuniformity of the social network is to blame for the inability of transfers to fully offset idiosyncratic shocks. However, they also find that total gifts (including remittances) are insufficient to offset expenses associated with healthcare, unemployment and funerals. De Weerdt and Dercon (2006) reach similar findings in their study in Tanzania. A number of studies find that gifts are relatively small compared to total income volatility in rural India (Reardon et al., 1988; Rosenzweig, 1988; Lim and Townsend, 1998; Imai, 2003). In their study of pastoralists in southern Ethiopia, Lybbert et al. (2004) find that reciprocal transfers are surprisingly small considering most shocks in the sample are idiosyncratic. McPeak (2006) finds similar results among livestock producers in northern Kenya.

While gifts are often seen as distinct from loans in studies of developing countries, and the latter as being less common due to a lack of legal structures required to enforce loan agreements, some researchers have found evidence of assistance more akin to flexible loans than to outright gifts. Udry (1990, 1994) observes that assistance in northern Nigeria is given ostensibly as an interest-free loan, with an expected future repayment, but that the repayment schedule can be altered – or repayment even abandoned – if the borrower suffers subsequent shocks. Similar results have been found in the Philippines (Fafchamps and Lund, 2003; Fafchamps and Gubert,

2007b). In a sense, the flexible loan arrangement is just a more codified version of the model of gift exchange presented by Kimball (1988) and Coate and Ravallion (1993), acknowledging the possible path dependence of innovations to income. A variation on the theme is to make bridewealth payments contingent on events, evidence of which was found in Zimbabwe by Dekker and Hoogeveen (2002).

As discussed above, the voluntary nature of transfers may be partly to blame for their inability to fully smooth idiosyncratic shocks. Platteau (2006) argues that societies go to great lengths to create severe punishments and disincentives to coerce individuals to assist others in times of need. As Kimball (1988) and Coate and Ravallion (1993) show, these punishments work better when interactions are an infinitely repeated game, and are more likely to take place among individuals with greater leverage and common identity, such as family members, religious groups and tight-knit villages. However, this creates a concentration in the insurance network that can undermine the system's effectiveness and induce inequality.

1.3.3 Implications of the social network for informal insurance

The structure and evolution of the social network, and the extent to which these characteristics define the effectiveness of informal insurance, are the focus of a flourishing literature.[5] There is evidence that the structure of the social network conditions the flow of transfers in developing countries. While not particularly surprising in light of the theoretical benefits (in terms of monitoring and enforcement) of risk sharing with close friends and family, this result has profound implications for the effectiveness and inclusiveness of informal insurance. In Ghana, Goldstein et al. (2002) found that whether an individual received assistance in times of need depended on characteristics such as membership in the major lineage,

[5] See, for example, Bloch, Genicot and Ray (2008) and Krishnan and Sciubba (2009).

participation in secular organizations, the individual's fostering history, and anticipated land inheritance. Using a later dataset from the same villages, Vanderpuye-Orgle and Barrett (2009) found that a set of 'socially invisible' individuals within the village (who were less well-known by their neighbors) received effectively no insurance against shocks, while others in the village who were well known were fully insured. Fafchamps and Gubert (2007a) found that network links were more likely among geographically proximate households in the Philippines, possibly reflecting kin ties. They found no evidence that ties were made to households with uncorrelated or negatively correlated incomes in preference to those with positively correlated incomes. Assistance has also been found to flow along ethnic lines (Fafchamps, 1992; Grimard, 1997 and La Ferrara, 2007), and gender lines (Goldstein, 2000). This implies that networks are formed based on locality, kinship and other metrics of common identity, rather than explicitly for insurance purposes, and not specifically to maximize gains from mutual insurance.

As with asset-based consumption smoothing techniques, informal insurance methods carry the risk of propagating and reinforcing inequality among individuals over time. (Fafchamps, 2003, Ch. 5, presents a rigorous exposition of this result.) First, theory suggests the rich are more capable of opting out of informal insurance schemes (Ligon et al., 2002; Sen and Hoff, 2005; Platteau, 2009). Empirical evidence of wealthy or more fortunate individuals unilaterally exiting such schemes has been found by Platteau and Abraham (1987) in Kerala fishing villages, and by Fafchamps and Lund (2003) in the rural Philippines. The rich may also be more capable than others of migrating, because they are not dependent on informal insurance; Munshi and Rosenzweig (2009) find evidence of low mobility among individuals in higher-income caste networks in India. Second, as discussed above there is evidence that the poor may be explicitly excluded from transfer networks if they are not well known or are from a minority ethnic group

(Santos and Barrett, forthcoming; Vanderpuye-Orgle and Barrett, 2009). Finally, transaction costs associated with forming and sustaining informal insurance networks imply that links are more likely to form between proximate neighbors and kin; evidence in support of this hypothesis has been found by Murgai (2002) in rural Pakistan, and by Fafchamps and Gubert (2007a) in the rural Philippines. Accordingly, richer households tend to be better insured than poorer households, since their close family and friends are more likely to also be rich.

1.3.4 Crowding out

An early link drawn between informal insurance and public policy was the hypothesis of crowding out. According to the crowding out hypothesis, to the extent that informal insurance is contingent on need and resources fungible, a formal transfer program to needy individuals would provide almost no additional benefit to their welfare. The new income would simply displace previously-received assistance from friends and relatives and thus be a transfer to the latter moreso than to the needy individual. Using household data from the Philippines, Cox and Jimenez (1995) estimated that transfers were very sensitive to the loss of income induced by unemployment – large enough that if an unemployment insurance scheme were introduced, transfers would fall by 92 percent. On balance, then, the unemployed would gain a net benefit of only 8 pesos from every 100 pesos paid to them in unemployment insurance. Subsequent studies have found statistically significant (but smaller) effects elsewhere. Jensen (2004) studied the introduction of a pension scheme in South Africa and estimated that for every rand given in pension payments, there was a reduction of around 0.25 rand of transfers received by the elderly from relatives. Studies of pension schemes in Peru and the Philippines find effects of similar magnitudes (Cox and Jimenez, 1992; Cox and Jimenez, 1995). Crowding out may be a greater

problem in villages where the variance of income is smaller; Albarran and Attanasio (2003) find supporting evidence of this from a randomized public transfer program in Mexico. However, even if crowding out does occur, it is not clear that public transfer schemes are less effective: first, since the funds implicitly spill over to other potentially vulnerable households; second, since public transfers may be more efficiently targeted than private transfers; and third, since displacement may be the price of reaching all households, including those not receiving private transfers (Morduch, 1999, p. 193). The hypothesis of crowding out is also predicated on a static coinsurance network. As Chantarat and Barrett (forthcoming) show, if public transfers alter the structure of the social network, they may induce crowding *in*, rather than crowding out.

1.4 Conclusions

The literature to date has highlighted the substantial riskiness of life in developing countries, whence the need for individuals to find ways to cope with risk in order to sustain their livelihoods in both the short and long run. Failure to do so imperils not only their lives, but also their future income earnings capacities and those of their children. Because of the failure of markets to provide adequate formal means of dealing with risk, individuals in developing countries are forced to rely on informal methods. Impoverished individuals who cannot do so risk being trapped, generation after generation, in a state of deprivation.

In this chapter I have reviewed the theoretical and empirical evidence on risk coping methods in developing countries. In studies from countries across the world, the general conclusion is that individuals cope only partially with the risks facing them – both from volatile income, and from events necessitating increased consumption. Their objective is not always to smooth consumption. Occasionally, individuals prefer to sacrifice consumption in order to

preserve their productive assets. The two primary methods of risk coping – buffer stock savings and informal insurance – have been found to provide only partial insurance against fluctuations in income and consumption. However, these methods endure because they are of some benefit in providing insurance against extreme shocks and redistributing resources from the rich to the poor, imperfectly fulfilling the roles of missing formal markets.

Recent research has identified the importance of the community context and the structure of the social network in conditioning informal insurance arrangements. Coverage may vary across individuals in the same community, and may not necessarily minimize income volatility. The difficulty of enforcing mutual insurance arrangements has led societies to develop strong redistributive and cooperative norms that bind communities together, discourage the sale of fixed assets such as land, and force individuals to contribute to the general good and provide assistance when requested to do so (Platteau 1994a, 1994b, 1997, 2006). Platteau argues that these 'solidarity norms' serve to discourage individuals from accumulating wealth, taking risks and migrating away from the community. These effects are both explicit (in the form of rules and sanctions against transgressors) and implicit (in the sense that the insurance provides protection that might be sacrificed by leaving the village). The objective of the following two chapters is to shed light on how the structure of the social networks, along with the social norms and institutions, of four small villages in rural Ghana, affect the incentives of individuals in these communities to invest in both public goods and productive assets. There is little empirical evidence on these points. The objective of this dissertation is to add to our knowledge on how social norms and obligations affect investment decisions. Understanding the true nature of this relationship is a necessary step in designing policies to promote investment, and thereby growth and development.

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CHAPTER TWO

Community Involvement in Public Goods Provision

2.1 Introduction

During the past two decades, economists have increasingly embraced the concept of community-driven development, a process by which public goods in developing countries are provided in consultation and collaboration with members of the recipient communities.[6] Relative to centralized provision by a government or foreign agency, community-driven development promises greater accountability, increased involvement by minorities, better targeting and quality of projects, and diminished potential for corruption and waste. Community involvement in the development of local infrastructure has become popular in the form of 'social funds', which have been set up and supported by external agencies such as the World Bank. Mansuri and Rao (2004, pp. 15–17) cite evidence from a range of studies suggesting that while community involvement in development projects can be beneficial, it does not always improve their success.

This study is concerned with the process of community fundraising for local infrastructure projects. Evaluative studies have found that infrastructure is better targeted, lasts longer and works better if community members are required to contribute to its cost (Jimenez and Paqueo, 1996; Kleemeier, 2000). There are a number of arguments in favor of seeking financial contributions from community members. First, community members should be willing to pay something for facilities that they use and value. Provided private contributions approximately reflect individuals' true social valuations, a community fund-raising initiative serves as an ex-

[6] For a comprehensive discussion of the history of community-driven development and its outcomes, see Mansuri and Rao (2004).

ante test of the community's need for the proposed infrastructure.[7] This should improve targeting and reduce wastage of funds on facilities that are not wanted by community members. Second, making a financial contribution to infrastructure encourages community members to become involved in other aspects of the project, and supports maintenance of the facility once built.[8] Third, funds raised from community contributions augment those provided by central government and donors, increasing the number of projects which can be completed with a given government or external donor budget. Community contributions thus reinforce the objectives of decentralized public goods provision, promoting local ownership and improving the targeting and mobilization of resources.

In this chapter I report the results of a field experiment in four small communities in southern Ghana that tests the willingness of individuals to contribute to local public goods. The experiment was conducted in five sequential rounds during 2009, in conjunction with a household survey. Before the study began, we held public meetings in each community and asked residents to nominate a small infrastructure project. We then visited participants five times during 2009, gave them a small endowment and invited them to donate to the project. I focus on two aspects of the contributions behavior of these individuals: the effectiveness of two commonly used mechanisms to encourage greater donations; and the effect of individual and social network characteristics on the amount contributed.

If individuals are expected to contribute towards the cost of local infrastructure, it would be useful to elicit contributions in a way that reflects their true valuation of the project. Projects that

[7] The notion of seeking community opinion on which projects to pursue is referred to in the literature as preference targeting. Evidence on its effectiveness is scarce. In a study of Jamaican Social Funds, Rao and Ibanez (2005) find that better-networked and elite members of the community tended to dominate the choice of projects, though in the long run there were high degrees of satisfaction with the projects among all community members.

[8] For instance, in her study of piped water schemes in Malawi, Kleemeier (2000) concludes that the infrastructure might have lasted longer had community members been charged user fees to fund maintenance.

are not sufficiently valued by the community might thereby be reconsidered or redesigned. However, because of the free-rider problem, private contributions may understate private demand. Individuals will tend to contribute less to a public good than their expected private benefit, expecting their neighbors to contribute the difference. This implies that the funds raised will fall short of the socially optimal level, leading to underprovision of public goods. Various mechanisms have been proposed which to some extent alleviate the free-rider problem. In this study, I test the effectiveness of two of these mechanisms: the matching grant and the provision point mechanism. These mechanisms have been tested experimentally in developed country contexts, but to my knowledge there have been no field experiments testing their performance in a developing country. It is therefore an open question whether they would be as effective in raising funds for community public goods.

Since all of the respondents in the household survey were participants in the experiment, I have detailed data on their individual and household characteristics and their social network. I use these data to describe who in the community donates the most, and whether high-status individuals can be relied on to contribute more. Previous studies have identified social capital as crucial to the success of community-driven development projects (Isham and Käkhönen, 2002). The theoretical literature on social networks and trust suggests that in the confined social setting of a small village, individuals' economic interdependence and susceptibility to social sanction should make them more willing to contribute to public goods (Fehr and Gächter, 2000). Since this interdependence is greater the smaller and more ethnically concentrated the community, we would expect contributions to be greater in such communities. There is suggestive empirical evidence that this is so. In their study of western Kenyan villages, Miguel and Gugerty (2005) found that the quality of public goods was worse in villages with greater ethnic diversity.

Akramov and Asante (2009) reach similar conclusions using data from Ghana. In a study of water and sanitation projects in Ghana, Sun et al. (2010) find that ethnically diverse communities are less likely to have functioning committees to manage provision at the local level, and accordingly a lower standard of water and sanitation facilities. This suggests that the observed connection between ethnic heterogeneity and diminished success of community-driven development projects may be due to the ineffectiveness of political systems in such communities. With a sample of four villages I cannot draw conclusions about the effects of ethnic heterogeneity or village size on aggregate behavior. However, using a unique dataset on the social networks of the study communities I focus on how social attitudes, position in the social network, ethnicity and social status affect individual behavior.

This study makes a number of novel contributions. To my knowledge it is the first field experiment to assess the public goods contributions behavior of individuals in a developing country, and the first to test the matching grant and provision point mechanism in this context. Furthermore, it is the first experiment to compare the two mechanisms to each other, yielding valuable information on their relative effectiveness. I provide the first experimental evidence on which individuals contribute the most to public goods, an important factor in understanding the relationship between status, the social network and development in rural communities. More broadly, the results of this study have implications for the design of effective development policy, and for our overall understanding of economic behavior.

The chapter is structured as follows. In Section 2.2, I describe the existing literature on the matching grant and provision point mechanism. I introduce the study communities and discuss their economic circumstances in Section 2.3. In Section 2.4, I describe the sampling procedure used to select participants, and the household survey in which they took part. Section 2.5

presents the design of the public goods experiment, describing the process by which public projects were selected in each community and how individuals were invited to contribute to the projects. In Section 2.6, I discuss the qualitative results of the experiment. In Section 2.7, I then look more closely at the results using econometric models. Section 2.8 presents a discussion of the policy implications stemming from my findings, and Section 2.9 offers concluding remarks.

2.2 Previous research on incentive mechanisms

It is well known that public goods provision is hampered by the free-rider problem. Where individuals bear the cost of funding public projects through individual voluntary contributions (a scheme hereafter referred to as a voluntary contributions mechanism, or VCM), individuals' donations typically fall short of their true private valuation of the project (Bagnoli et al., 1992; Fischbacher et al., 2001). Various mechanisms have been proposed in which the Nash equilibrium is for individuals to reveal their true private valuations (Clarke, 1971; Groves and Ledyard, 1977; Smith, 1979). But these mechanisms are too complex to be employed in most real-world applications. Accordingly, a number of second-best mechanisms have been tested experimentally in the laboratory and in the field.[9] The two mechanisms I test in this paper are the matching grant and the provision point mechanism.

A matching grant is a promise made by some authority or major donor to match private contributions in some fixed proportion. For instance, a philanthropic benefactor might pledge to match public contributions, or the government might offer an income tax deduction for donations to registered charities. Matching grants should in theory boost contributions relative to the VCM, since they effectively reduce the 'price' of a given contribution to a public good. Laboratory

[9] There are many such mechanisms, the discussion of which is beyond the scope of this paper. List (2007) provides a recent summary of the experimental evidence on the effectiveness of these mechanisms.

experiments have confirmed this hypothesis (Eckel and Grossman, 2003; Baker et al., 2009). However, evidence from field experiments suggests that the effect of the match ratio is not large. Rondeau and List (2008) found that the matching donation did not have a positive effect at all, while Meier (2007) found that while a matching grant boosted contributions initially, its subsequent removal actually caused contributions to fall. Using data from a fund-raising campaign in the U.S., Karlan and List (2007) found that a match offer boosted response rates and the average amount donated, but changing the match ratio had little effect on the amount donated. In other words, to the extent that the matching ratio has any effect at all, the price elasticity of donations appears to decay rapidly as the match offer increases.

A provision point mechanism (PPM) consists of a fund-raising target and a money-back guarantee. The planner announces the fund-raising target to the community, and guarantees to refund all contributions if the target is not met. The PPM is well suited to the provision of lumpy goods, where the target is binding as the minimum amount of money for which the good can plausibly be delivered. It is also simple to explain and implement. Bagnoli and Lipman (1989) showed that, given full information, all perfect equilibria from such a game are Pareto optimal (that is, individual contributions reflect true private valuations).[10] This hypothesis has been tested in the laboratory using an induced value framework, with varying results. Rondeau et al. (1999) found that the PPM elicited contributions equal to private valuations. In similar studies by Isaac et al. (1989), Bagnoli and McKee (1991) and Poe et al. (2002), contributions under the PPM were higher than under the VCM – and provision of the public good more likely – but the mechanism fell short of being fully demand revealing. Rondeau et al. (2005) compared the VCM with the PPM in the laboratory and in a small field experiment, and found that the PPM induced

[10] Palfrey and Rosenthal (1984) provided an earlier proof of optimality for a more restrictive game, in which contributions were fixed.

generally higher contributions. However, the main effect of the PPM was felt at the top of the distribution (increasing the largest donations). One constraint on the real-world effectiveness of the PPM, relative to the theoretical predictions, might be that Bagnoli and Lipman's (1989) assumption of full information does not hold in practice. However, Marks and Croson (1999) conducted experiments to test the effect of limited information and found that it did not substantially change the impact of the PPM relative to a full-information treatment. There is only limited evidence on the effectiveness of the PPM in real-world applications. Rose et al. (2002) found that the PPM increased the rate of participation in a green energy program substantially above that of a treatment group.

There are various methods for dealing with contributions above the threshold. The nature of this rebate rule matters to the optimality of equilibria. Marks and Croson (1998) tested three such methods in the laboratory: a no-rebate policy, where excess donations are discarded; a proportional rebate, in which the excess funds are divided among the donors in proportion to their contributions; and a utilization policy, in which excess funds are spent on the public good. They found that average contributions were significantly higher under the utilization policy than under the no-rebate and proportional rebate policies. In this study I adopt the utilization policy.

This is to my knowledge the first field experiment to test the effectiveness of the matching grant and PPM in a developing country. Moreover, these two mechanisms are tested in such a way that I can assess not only their effectiveness relative to a simple voluntary contributions mechanism (VCM), but also relative to each other. Such a comparison has not hitherto been performed in the literature.

2.3 Introducing the study area

The field experiments were conducted between March and December 2009 in conjunction with a year-long household survey in four communities in Akwapim South district, Eastern Region. The survey was part of a three-wave panel, the first two waves having been conducted in 1997-98 (Udry and Goldstein, 1999) and 2004 (Vanderpuye-Orgle, 2008). The original 1997-98 study was concerned with the welfare of farmers in Ghana's export pineapple industry, and the survey area was chosen because of that district's significant involvement in the industry.

The Akwapim South district has historically been a center of fruit farming – initially cocoa, and more recently pineapple and pawpaw. The district lies immediately to the north of Accra, Ghana's capital city. The growth of the commercial centers of Aburi and Nsawam, which lie on the two main roads heading north from Accra, has changed the pattern of employment in the survey communities. Two of the communities (Konkonuru and Darmang) lie close to these towns, and a significant number of survey respondents in these communities derive their primary income from non-farm business or waged work. In the other two communities (Oboadaka and Pokrom), which lie in a valley a long way from Aburi and Nsawam, the majority of the respondents are still primarily farmers who travel to the towns weekly to trade. All four communities are quite poor. During 2009, mean per capita consumption (averaged over all five rounds) ranged from GH¢54.42 to GH¢75.58 per month across the four communities.[11]

All of the communities lack some basic public services. None has piped water, all relying primarily on boreholes for water. Each has at least one primary school and one junior secondary school, but some are in states of disrepair or were never completed. Less than half of households have their own toilet, and none of the communities has sufficient public toilets given its

[11] During 2009, one Ghana cedi (GH¢) averaged about 69 US cents. Converting without PPP adjustment, this equates to a mean per capita consumption level of between $1.24 and $1.72 per day.

population. Each community has a health clinic, and there is a major hospital at Nsawam. Konkonuru and Darmang are accessible by a paved road, while Oboadaka and Pokrom are only reachable by dirt road. All of the communities except Oboadaka have electricity. Public goods are provided by a number of entities: the national government, the district assembly (the local government body), private donors, NGOs and foreign governments. In 2009 the Government of Ghana's Millennium Development Agency (MiDA) commenced an extensive support program throughout the country, which so far has resulted in the refurbishment of a primary school in one of the survey communities, the training and equipping of farmers, and will soon fund the rehabilitation of a feeder road connecting the two more remote communities to Nsawam. Usually, however, projects are not well coordinated and sometimes left incomplete, resulting in infrastructure which is defective or unusable, and which often decays faster than intended. In one community, the junior secondary school had no doors or windows for one classroom; in another, the school's toilets were not connected to running water and could therefore not be used. In informal discussions community members stated that the poor state of public infrastructure in part reflects a lack of accountability of the providers and a lack of ownership of the projects by the local community. Contractors have an incentive to cut costs in order to boost profits, especially where there is little auditing or follow-up of projects by government to assess quality and durability. If community members were responsible for part of the cost of these projects, they might be more inclined to report defects in the work and take responsibility for the maintenance of the facilities.

2.4 Sample and household survey

The sample consisted of approximately 70 households in each of the four communities.

According to our initial listing in January 2009, the four communities had between 180 and 580 households, so that our sample covers between 12 and 40 percent of households.[12] Around half of these households were part of the initial 1997-98 sample, and the rest were recruited in January 2009 using stratified random sampling.[13] In the original sample, and in the 2009 re-sampling, we selected only from the pool of households headed by a resident married couple.[14] However, we retained households from the 1997-98 sample even if only one of the spouses remained. These 'single-headed households' account for between 7 and 15 of the sample households in each community. Thus around 150 individuals participated in the experiment in each of the four communities (Table 2.1).

Table 2.1. Sample size by community and respondent type

	Community				
	Darmang	Pokrom	Oboadaka	Konkonuru	Total
Husbands	70	67	69	68	274
Wives	77	71	73	68	289
Single males	4	3	1	4	12
Single females	7	5	6	11	29
Total	158	146	149	151	604

The household survey covered a wide range of subjects, including personal income, farming and non-farm business activities, gifts, transfers and loans, and household consumption expenditure. Each individual was interviewed five times during 2009, once every two months. In addition, we conducted a detailed survey of respondents' in-sample social networks. The social

[12] Including children, my rough estimates of the populations are 706 in Oboadaka, 1,270 in Konkonuru, 1,768 in Darmang and 2,283 in Pokrom.
[13] New sample members were selected randomly from the subset of households in the community headed by a married couple. The sample was stratified by age of the head into three categories: 18-29, 30-64 and 65+, so that the shares of households whose head was in each of these age categories corresponded to the population shares. The stratification was designed to reinstate representativeness given that households with heads under 30 did not exist in 1997-98, and those with heads over 65 had suffered greater natural attrition.
[14] Some men in the sample had two or three wives, all of whom were included in the sample.

network survey was conducted in the first round. Each respondent was asked in turn about every other respondent in the sample from his or her community. We asked whether they knew the person, by name or personally, how often they saw them, whether they were related, how strong they perceived the friendship to be, whether they had given or received anything of value from the person, and whether they would trust the person to look after a valuable item for them. Summary statistics of the variables used in this study are given in Table 2.2.

2.5 Experimental design

Two weeks prior to the start of each survey round, we visited each community and conducted one round of the public goods experiment. In all, we conducted five rounds of the experiment. The first round was conducted prior to the second round of the survey, and the fifth followed the final round of the survey.

Before the experiments began, we held an open meeting in each community. We did not provide details of the experiment, but explained that participants would be given money for their time in the survey, and would be invited to donate to a public good. Supposing the community could raise around GH¢1,000, what would they most like to spend that money on? We gave only a few guidelines: it had to be a self-contained project, affordable with that amount of money. The community members suggested a number of projects, which were then categorized as feasible or infeasible depending on their cost. Those at the meeting then voted on which of the feasible projects to pursue.[15] The final choices were: renovation of primary school toilets in Konkonuru; construction of a maternity ward for an existing health clinic in Oboadaka; a second public toilet block in Pokrom; and renovation of the junior secondary school (JSS) in Darmang.

[15] A number of studies have considered the effect of voting itself as a contextual mechanism for enhancing contributions (see, for example, Messer et al. 2007). In a study of four communities I could not test this claim, but considered voting the fairest way of establishing community consensus on a single project.

Table 2.2 Summary statistics

Variable	N	Mean	SD	Min	Max
Donation (GH¢)	2,070	0.70	0.60	0	6
Match ratio	2,070	1.03	0.71	0	2
Household wealth (GH¢)	2,070	2,878.22	14,411.10	8.70	^
Monthly per capita expenditure (GH¢)	2,070	104.99	87.76	4.01	1,481.35
Household size	2,070	5.22	2.22	1	15
Age (years)	2,070	43.61	13.72	19	85
Sex (male=1)	2,070	0.47	0.50	0	1
Could trust neighbor					
Strongly agree	2,070	0.09	0.28	0	1
Agree	2,070	0.40	0.49	0	1
Neutral	2,070	0.17	0.38	0	1
Disagree	2,070	0.26	0.44	0	1
Strongly disagree	2,070	0.07	0.26	0	1
Social network variables *					
Number known by respondent	2,070	99.72	30.92	4	151
Number who know respondent	2,070	92.78	28.45	15	151
Number trusted by respondent	2,070	27.50	29.89	0	145
Number who trust respondent	2,070	26.55	14.17	3	82
Share trusted by respondent	2,070	0.30	0.31	0	1
Share who trust respondent	2,070	0.28	0.10	0.04	0.55
Status and migration variables					
Holds office	2,070	0.08	0.27	0	1
Akwapim	2,070	0.81	0.39	0	1
Fostered as child	2,070	0.60	0.49	0	1
Lived in village less than 5 years	2,070	0.08	0.27	0	1
Years in village	2,070	26.07	16.08	0	75.42
Share of life spent in village	2,070	0.59	0.31	0	1

Notes: ^ Omitted for privacy reasons. Median wealth was GH¢1,099.50. * From census of the in-sample social network. Numbers reported are from the sample of survey respondents in that community.

We informed the community members that their choice could be changed later on, provided there was majority community support for the change.

An assistant and I conducted the experiments with support from the survey enumerators.[16] Respondents were called on a given day to report to the local primary school, where they signed

[16] A copy of the full script for the experiment is provided in the Appendix.

in and took a ticket with their individual ID number written on it. One by one, they were invited into a closed classroom to receive their endowment and make a donation if they wished. Care was taken to keep these solicitations private, and the amounts each individual donated were not disclosed to any other community member or participant. Only an interviewer and a record keeper (who took a written note of the donation) were witness to the respondent's decision.[17]

Upon entering the room, the respondent was seated at a desk facing the interviewer and record keeper. The interviewer explained (in Twi, the local language, as most of the respondents did not speak English) that the respondent was to receive a small amount of money (endowment) for their time and co-operation in the previous round's survey.[18] Since most respondents were poor and often short of cash, the endowment was designed to 'even the playing field' of cash-on-hand across respondents, removing potentially contaminating differences in ability to contribute among respondents. The endowment varied by round. In round 1, we gave GH¢1 to each respondent; in rounds 2 and 3 we gave GH¢2, in round 4 we gave GH¢4, and in round 5 we gave GH¢6. This variation allows me to measure the income elasticity of demand for donations, and test whether the size of the endowment is a binding constraint on larger donations.

The interviewer then explained that we were raising money for a public project, and briefly described the project chosen by that community. The respondent was invited to donate to the project, but was not compelled to. Any donation they made would be kept confidential, and their choice would not affect their ongoing participation in the survey.

The respondent was then invited to draw a token from a bag to determine the matching

[17] It was impossible in this context for donations to be anonymous to the researchers and still be individually matched and linked to individual characteristics. The key objective was to remove the effect of coercion, common knowledge and peer pressure on participants' donation decisions.

[18] The endowment was deliberately framed as payment for the survey to reduce any 'endowment effect' in the experiment. To this end, respondents were told during the survey rounds how much they would be paid for their interview, and given a small ticket to 'redeem' their payment.

ratio. There were five tokens in the bag, each a different color, representing matching ratios of 0, ½, 1, 1½ and 2. We took great care to ensure the draw was blind and random. A table relating the colors to the matching ratios was displayed on a sheet in front of the respondent. (A copy of this table is also included in the Appendix.) The interviewer explained what matching ratio the respondent had drawn, and what that meant. For any matching ratio *m*, we would add *m* times the respondent's donation to the total funds raised. If the token representing zero were drawn, no matching grant would be given. We gave the respondent various examples, and quizzed them to check they understood the concept. The respondent was then given their endowment in cash and invited to make a donation if desired. To minimize rounding issues, we gave the first GH¢2 of the endowment in 20p coins and the remainder in GH¢1 notes. [19] Respondents were able to ask for change, so that any donation was feasible. Once they had made their donation, the match was added. We checked that the respondent was satisfied with their choice, and then the total amount was put in the donation box. Once the respondent had left the room, the match ratio and donation were recorded on a sheet against their name.

In the final two rounds, the procedure was modified slightly to include a provision point mechanism (PPM).[20] After mentioning the project, the interviewer pointed to a sheet in front of the respondent that showed the amount raised and a fund-raising target (including a graphical depiction of the proportion of funds raised).[21] Based on donations from the first three rounds and the realistic minimum cost of the projects, we set targets of GH¢750 in three communities and GH¢1,000 in Pokrom (which had at that point raised substantially more than the other three). The interviewer explained that the project could not go ahead unless the target was reached, and that if the target was not reached, all donations from the fourth and fifth rounds would be

[19] There are 100 pesewas (p) in a Ghana cedi.
[20] We continued to give respondents a matching grant, in exactly the same manner as described above.
[21] Refer to the Appendix for an example of this sheet.

refunded. The funds raised in the first three rounds would be spent on maintenance of existing public buildings. The interviewer explained that the respondent would receive a receipt for their donation, and that they could use this receipt to claim reimbursement if the project did not go ahead. The rest of the experiment proceeded as in the first three rounds, except that at the end a receipt was given to the respondent for the amount donated.

Once all respondents present had been interviewed, we counted the amount raised and crosschecked against the total from the record sheets. The amount was announced to the assemblyman, who in turn informed the community members.[22] We also announced the progressive total amount raised at subsequent meetings with the respondents. At the end of the five rounds, the amounts raised were to be spent on the designated project, provided the target had been reached. Respondents who did not attend the experiment for a given round could claim their endowment in the next round in addition to that round's endowment; therefore, some respondents received larger endowments in later rounds.[23] Funds not claimed at the end of the fifth round were counted as full donations and added (without a matching grant) to the funds raised for the community. Those amounts are excluded from the analysis below.

2.6 Initial observations

All four communities reached their targets, though Konkonuru did so by only a small margin. Overall, only 5 percent of respondents did not donate (Table 2.3). The incidence of non-contribution was much higher in Konkonuru, where 32 percent of respondents made no contribution in round 1. In the other three communities non-contribution rates ranged from zero to 6 percent. In all communities, non-contribution dropped off sharply in rounds 4 and 5 with the

[22] The assemblyman is the community's organizer and 'secretary'.
[23] About 10 percent of the sample received 'extra endowments' in this manner.

increase in endowments and the introduction of the provision point mechanism.

Table 2.3: Non-contribution rates (percentage of participants who donated nothing)

	Community				
Round	Darmang	Pokrom	Oboadaka	Konkonuru	**Total**
1	5.2	3.2	2.6	32.1	10.7
2	3.4	0	2.4	17.1	5.7
3	7.8	0	6.1	17.5	7.9
4	0	0	0	2.4	0.6
5	0	2.3	0	2.8	1.3
Total	3.2	1.1	2.3	13.5	5.1

Even in Konkonuru, however, the rate of non-contribution was much lower than in similar studies in Western countries, where it is common for more than half of the sample to refuse to donate.[24] In part, this may have been due to the presence of the interviewers. Since Ghanaian social norms dictate that people should not refuse a request for money from a friend in need, they may have felt obliged to give something in response to a request from researchers. For example, in the first round a donation of 20p was the mode in some communities; since the endowment was given in 20p coins, this might have been a 'token donation' by individuals reluctant to give. It could also be due to the fact that the individuals were given an endowment, and could not use the excuse 'I don't have any money'. These considerations were unavoidable given the experimental design, but should be borne in mind when interpreting the results. However, their presence was constant throughout the year, and should not affect comparisons between individuals or across rounds.

Table 2.4 presents the mean donations in each round. It is apparent that some

[24] For example, Karlan and List (2007) reported response rates of around 2 percent in their study, and List and Lucking-Reiley (2002) reported response rates of 3.4 to 8.4 percent. Both studies relied on mail-out solicitations, so there are clearly other explanations for these low figures (such as wrong addresses, absenteeism and the lack of face-to-face interaction). However, they illustrate how difficult it can be to solicit donations from individuals.

communities donated substantially more than others. In part this reflects different characteristics of the respondents (such as differences in wealth), which I will explore in the regression analysis. Even after taking those factors into account, however, there is a residual difference which reflects characteristics of the community and of the project. First, comments by some respondents in the interviews made it clear that the renovation of the school toilet and JSS buildings were markedly less popular for a number of reasons. Some respondents said they were reluctant to donate because their children didn't attend that school, or because they didn't have school-age children. In Konkonuru (raising money for a school toilet), respondents argued that the teachers locked the toilet even when it was working, and that their children therefore would not benefit from it. Second, there was a distinct difference in the degree of support provided by the community leaders. The leaders of Darmang and Oboadaka tried significantly harder to garner support and attendance from respondents. However, this appears to have affected attendance more than donations, since Darmang raised the least money despite being the wealthiest of the four communities.

Table 2.4: Mean donations by round and community (in Ghana pesewas)

	Community				
Round	Darmang	Pokrom	Oboadaka	Konkonuru	**Total**
1	29.9	52.8	37.4	34.5	37.6
2	34.7	69.9	36.7	39.7	45.2
3	41.0	65.4	39.8	33.5	44.4
4	76.1	109.7	144.7	66.1	97.8
5	106.4	117.9	145.4	97.2	115.6
Total	58.7	85.1	79.6	56.3	69.5

The matching ratio varied randomly across individuals and rounds. Table 2.5 provides a summary of the mean ratios in each village and round, along with standard errors and *t*-statistics.

These are generally around 1 on average, and not significantly larger than 1 at the 10 percent level in any one experimental session.[25] Looking at a simple bubble graph (Figure 2.1), the matching ratio appears to have had a slightly positive impact on donations, primarily by lifting donations at the top of the distribution.

Table 2.5: Summary statistics on match offers

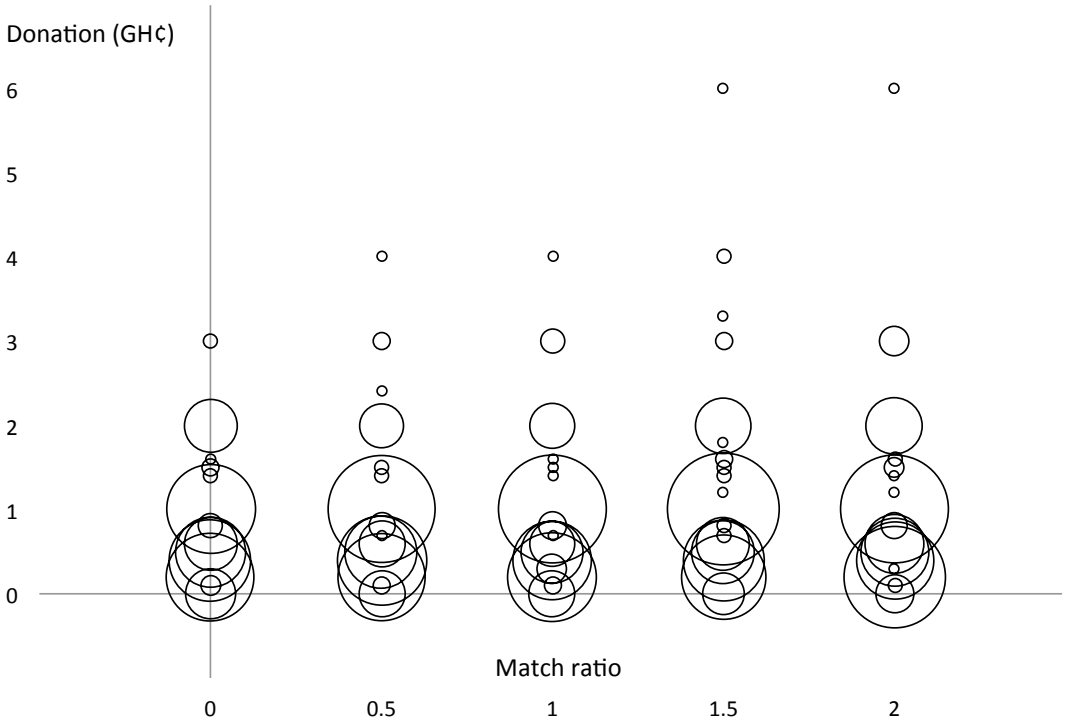
	Community				
Round	Darmang	Pokrom	Oboadaka	Konkonuru	**All communities**
1	**0.931**	**1.018**	**1.010**	**0.984**	**0.981**
	(0.717)	(0.683)	(0.704)	(0.670)	(0.695)
	[-1.096]	[0.241]	[0.140]	[-0.230]	[-0.567]
	131	83	103	95	412
2	**1.097**	**1.082**	**1.136**	**1.057**	**1.094**
	(0.707)	(0.744)	(0.748)	(0.718)	(0.727)
	[1.464]	[1.120]	[1.874]*	[0.778]	[2.648]***
	113	104	107	97	421
3	**1.009**	**1.005**	**1.083**	**1.099**	**1.050**
	(0.691)	(0.689)	(0.704)	(0.724)	(0.701)
	[0.138]	[0.076]	[1.264]	[1.339]	[1.442]
	110	92	114	96	412
4	**0.961**	**1.057**	**1.062**	**1.123**	**1.049**
	(0.741)	(0.707)	(0.682)	(0.696)	(0.708)
	[-0.566]	[0.794]	[0.930]	[1.813]*	[1.410]
	115	96	105	106	422
5	**1.035**	**1.026**	**0.947**	**1.009**	**1.006**
	(0.721)	(0.728)	(0.703)	(0.669)	(0.705)
	[0.547]	[0.384]	[-0.771]	[0.139]	[0.198]
	130	115	103	115	463
All rounds	**1.005**	**1.039**	**1.049**	**1.054**	**1.035**
	(0.716)	(0.710)	(0.709)	(0.694)	(0.707)
	[0.171]	[1.208]	[1.590]	[1.756]*	[2.312]**
	599	490	532	509	2,130

Notes: Table reports mean match ratio offered in each experimental session. Sample standard deviations are reported in parentheses, and t-statistics (against the null that the mean ratio is 1) in square brackets. The last row of numbers is the sample size. In a test of the hypothesis that the mean ratio is 1, *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

[25] In aggregate the ratios offered in round 2 and in village 4, and thereby overall, are statistically different from 1 at the 5 percent level. This should not be of concern as long as the ratio offers are random across individuals. I tested whether this affected the results by excluding round 2 and village 4, but there were no substantial differences. Results of these tests are available on request.

Figure 2.2 presents the cumulative distribution function (CDF) of donations for each community. Since donations were almost all in multiples of 10p, the CDFs in Figure 2.2 are smoothed: uniform random variation of up to 5p was added to each donation in order to separate the lines and make them easier to read. The CDFs show significant clustering of donations at points like 20p, 50p and GH¢1, perhaps reflecting people's reluctance to ask for change and donate their true valuation. It might even be a manifestation of 'coherent arbitrariness' due to uncertainty over the true valuation.[26] The 20p mode is apparent in Figure 2.1, but a number of individuals donated substantially more, a few even adding to the endowment with their own money. It is also worth noting that the distribution of donations in rounds 2 and 3, in which we

Figure 2.1: Effect of matching ratio on donations



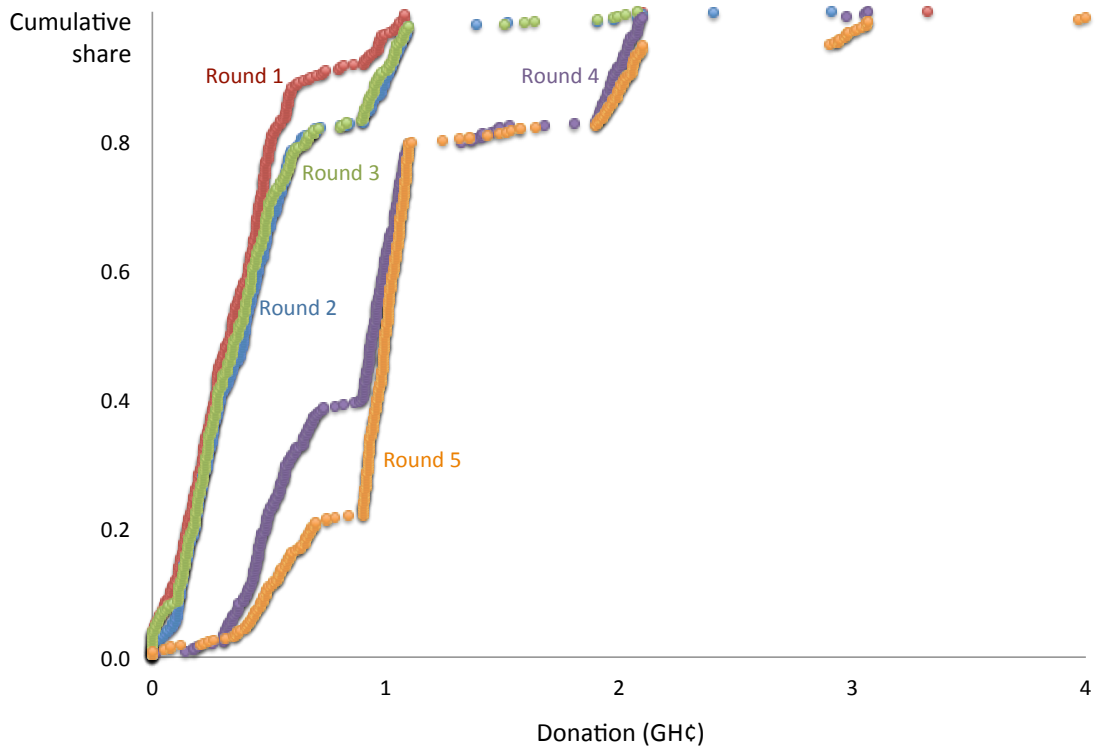
Note: Bubble area proportional to frequency.

[26] 'Coherent arbitrariness' describes the tendency of individuals to be influenced by arbitrary anchors in determining their willingness to pay for goods without a well-defined reference price (Ariely et al., 2003).

doubled the endowment to GH¢2, is very similar to the distribution for round 1. For the majority of individuals, therefore, doubling the endowment had no effect on the amount donated. The only visible difference is in the second-top decile of donors, whose donations rose from around 50p to around 80p. Only a handful of people gave more than GH¢1 in rounds 2 and 3, suggesting that the GH¢1 endowment in round 1 was not a significant constraint on donations.

The effect of the provision point mechanism (PPM) on donations in rounds 4 and 5 is readily apparent. As discussed in Section 2.2, this mechanism is designed to alleviate the free-rider problem by providing prospective donors with a guarantee that, should the project be underfunded, it will not go ahead and they will get their money back. This assuages concerns that insufficient funds will be raised and the project will be of poor quality, thereby encouraging

Figure 2.2: Cumulative distribution of donations (all communities)



those who are hesitant to donate. One would accordingly expect the PPM to increase contributions, lifting each person's donation towards their true private valuation of the project. The size of contributions indeed rose in the last two rounds, both in absolute terms and in proportion to the endowment (Table 2.4). The increase was substantial and affected the entire distribution.

After including uncollected monies, all four communities passed their targets. We met with each community and, in consultation with experts from the Akwapim South District Assembly, costed each of the projects. The community that had chosen to build a public toilet (Pokrom) changed its choice of public good, because the money raised would only build a small toilet which was considered inadequate for the town's population. Instead, they chose to spend the money on a new kindergarten. Each community elected a committee to oversee the project work, and also volunteered resources like sand, water, stones and artisanal labor. All four of the projects have now been completed.

2.7 Econometric analysis

One strength of the experiment's design is the wealth of survey data available on each respondent, which allows me to relate donations to individual characteristics. We collected data on wealth and consumption five times during the year, giving a dynamic picture of the respondents' financial situation over the course of the experiment. In order to measure the effect of characteristics on contributions, I estimate a regression model of the amount donated by each respondent in each round.

The first objective of this analysis is to measure the impact of the matching grant and provision point mechanism (PPM) on donations. The theoretical literature on these mechanisms

does not provide much guidance on specification. If the matching ratio has an influence on donations by altering the price of contribution, the relationship between the ratio and donations may be nonlinear depending on the functional form of individual preferences for the public good. Furthermore, we might expect to see threshold effects in behavior when the match offer takes effect – that is, a discrete difference between the zero and non-zero match offers. I therefore consider a specification in which the match ratio is included as a set of dummies for the five possible ratios. A linear specification yielded equivalent results; the coefficient estimate is reported in Footnote 30. The PPM was introduced in the last two rounds, therefore its impact can be observed by including a set of round effects. Figure 2.2 suggests the effect of the PPM on donations should be substantial. However, the round effects will also pick up other seasonal effects and the variation in the endowment. I control for seasonality in individual income by including log household wealth in the specification.[27] I estimate the effect of the endowment by looking at the marginal increase in donations among those individuals who were absent in a round and subsequently collected a larger endowment. By subtracting this from the round effect estimate, we can derive an indirect measure of the impact of the PPM. An alternative approach I then consider is to drop the round effects and make use of the variation in endowment among absentees to measure its effect directly. This isolates the effect of the PPM on contributions in the last two rounds.

The second objective of the regression analysis is to measure the effect of individual characteristics on donations. In addition to log wealth, which is a household-level variable, I add controls for the respondent's age and sex. I also include a measure of trust, since individuals might be concerned about the likelihood of their donations being misappropriated by community

[27] I also tried log per capita consumption, which is a more effective indicator of seasonality; its coefficient was small and insignificant. In any case, wealth gives a better sense of an individual's means and therefore willingness to contribute. Income would have been a better measure theoretically, but was too volatile to be significant.

leaders (or the survey team) and about the way the public good will be managed once built. To account for this, I use information from a survey module on social attitudes. The module obtained Likert scale responses measuring the respondent's agreement with five statements about trust in neighbors, government and officials. I tested each in the specification; the only one that was significant was 'I feel I could trust my neighbors to look after my house while I am away'. This was measured on a scale of 1 to 5, with 1 representing 'strongly agree' and 5 'strongly disagree'. I include this variable as a set of four dummies called *social* (excluding 'strongly disagree').

The social networks survey collected detailed data on the nature of relationships between the respondent and every other sample member from their community. I test various measures of the size and quality of an individual's social network, including the number of sample members known by the respondent, the number of these the respondent trusts, the number of respondents who report knowing the individual, and the number of these who trust the individual. These variables are represented generically in the specification below by the variable *socnetwork*.

Because of the likelihood of individual heterogeneity in contributions over the five rounds, I estimate a model with individual-level fixed effects. For comparison, I also present estimates from OLS and random effects specifications. However, a Hausman test rejects the hypothesis that the random effects specification is analogous to the fixed effects specification, therefore the random effects results (and, by extension, the OLS results) are inconsistent. In order to obtain consistent estimates of the key time-invariant characteristics of respondents that are washed out by the fixed effects estimator, I estimate the fixed effects model in two stages. First, I estimate the model:

$$donation_{it} = \alpha + \sum_{j=2}^{5} \beta_j ratio_{it}^{j} + \gamma \cdot extracash_{it} + \varphi \cdot logwealth_{it} + \sum_{m=2}^{5} \rho_t^m + \nu_i + \varepsilon_{it} \quad (2.1)$$

where ε_{it} is a white noise disturbance. The dependent variable is individual *i*'s donation in Ghana cedis in round *t*. The variable *ratio* represents a set of four dummies for the match ratio offered (0.5, 1, 1.5 or 2), excluding zero. The variable *extracash* is the *additional* endowment given to those respondents not collecting money in previous rounds; the remainder is captured by the round fixed effect. Household wealth in the month just prior to the round is captured by *logwealth*, specified in logs because the variable is approximately lognormal across the population. This measure varies across rounds, capturing seasonal effects and economic shocks to individuals during the year that might affect donations. The ρ^m are round controls, and ν_i are individual fixed effects.[28]

To obtain consistent estimates of the marginal effect of time-invariant individual characteristics on donations, I then regress the estimated fixed effects, $\hat{\nu}_i$, on these variables in an auxiliary OLS regression:

$$\hat{\nu}_i = \delta_1 age_i + \delta_2 sex_i + \delta_3 socnetwork_i + \sum_{k=2}^{5} \theta_k social_i^k + \vartheta_{it} \quad (2.2)$$

The respondent's *age* is measured in years, and *sex* takes the value one if the respondent is male, zero otherwise. As described above, *socnetwork* is a measure of the individual's social network and trustworthiness, and *social* captures the respondent's degree of trust in her community in general.

The estimates for Equation 2.1 (along with OLS and random effects results) are presented in Table 2.6a, and the estimates for Equation 2.2 are presented in Table 2.6b. The latter results are presented with robust standard errors to control for heteroskedasticity. Individual wealth and consumption were not available in the survey data, so I use household wealth.[29]

[28] Since *extracash* is zero for all individuals in round 1, I omit the round 1 fixed effect.
[29] Household wealth includes stocks of food, farm output, livestock, business assets, goods for sale, durables, net balances owed by others, bank balances, and the value of jewelry and investments. It does not include land or building wealth.

Table 2.6a: Estimates of Equation 2.1

	Fixed Effects		OLS		Random Effects	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Match ratio (0 omitted)						
0.5	0.025	0.032	0.018	0.029	0.021	0.030
1	0.071**	0.032	0.035	0.030	0.052*	0.030
1.5	0.080**	0.032	0.100***	0.032	0.093***	0.030
2	0.063**	0.031	0.095***	0.031	0.081***	0.029
Extra GH¢ endowment	0.160***	0.012	0.156***	0.020	0.160***	0.009
Log household wealth	-0.024	0.025	0.020*	0.010	0.015	0.013
Round (1 omitted)						
2	0.062**	0.029	0.052**	0.024	0.055*	0.028
3	0.014	0.029	0.000	0.023	0.005	0.029
4	0.557***	0.029	0.558***	0.029	0.556***	0.028
5	0.661***	0.029	0.661***	0.032	0.660***	0.028
Constant	0.503***	0.178	-0.338***	0.099	-0.338***	0.113
N	2,070		2,070		2,070	
Groups	515		--		515	
(Adjusted) R^2	0.369		0.444		0.439	
Breusch-Pagan $\chi^2(1)$	--		854.4***		--	
Hausman $\chi^2(10)$	22.00**		--		--	

Notes: Dependent variable is donation in GH¢. Random and fixed effects are at the individual level. *** indicates significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level. Robust standard errors reported for OLS regression.

The coefficient on gender is significant and positive, indicating that males donated 8-9p more than females on average. However, since we only collected data on household wealth, any differences in the spending power of men relative to women in the same household are captured only by the gender variable. It is common in Ghana for the husband to earn a large share of the household's cash income, so this may explain the gender difference in donations. Having said that, household wealth has almost no effect on donations after controlling for household fixed effects (or individual characteristics). I find that older individuals donated more. The greater an individual's reported trust of their neighbors, the higher their contribution. This might reflect the importance of an individual's confidence about the way in which the public good would be built

or managed by their community, and potentially also about whether the survey team would act as promised in spending the raised funds.

Table 2.6b: Estimates of Equation 2.2

	Fixed Effects		OLS^		Random Effects^	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Age (years)	0.003***	0.001	0.002***	0.001	0.002**	0.001
Male	0.083***	0.013	0.090***	0.020	0.083***	0.027
Could trust neighbor with valuable item ('Strongly disagree' omitted)						
Strongly agree	0.159***	0.034	0.165***	0.056	0.162**	0.067
Agree	0.088***	0.027	0.080*	0.046	0.081	0.056
Neutral	0.038	0.027	0.025	0.047	0.031	0.061
Disagree	0.049*	0.027	0.043	0.046	0.045	0.058
Share trusting respondent	0.757***	0.093	0.671***	0.142	0.730***	0.175
Village (Darmang omitted)						
Pokrom	0.354***	0.024	0.322***	0.034	0.332***	0.045
Oboadaka	0.325***	0.020	0.304***	0.034	0.314***	0.043
Konkonuru	-0.018	0.019	-0.011	0.028	-0.010	0.038
N	2,070		2,070		2,070	
Groups	515		--		515	
R^2	0.248		--		--	

Notes: *** indicates significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level. Robust standard errors reported for OLS regression. ^ Reported coefficients estimated jointly with model in Table 2.6a.

2.7.1 Effect of the match ratio and endowment

The coefficients relating to match ratios of 1, 1.5 and 2 are all statistically significant at the 5 percent level, adding an estimated 7-10p to donations relative to the no-match case. This effect compares to a mean donation of 37.6p in round 1 and 69.5p over all five rounds, thus it is quite significant in economic terms. The implied price elasticity of donations is -0.26, therefore inelastic, and not substantially different from the elasticity of -0.38 implied by the results of Karlan and List's (2007) study.[30,31] However, in Karlan and List's study the response rate was

[30] In order to calculate this elasticity, I re-estimated the model with *ratio* included as a linear term. The coefficient estimate was 0.054 (standard error 0.014).

very low, so that there was a large difference between the mean overall donation and the mean donation by existing contributors. In contrast, in this experiment there was a small difference between the two due to very high rates of participation. The implied price elasticity for *existing* contributors in Karlan and List's study was effectively zero.[32] Similar to the results found by Karlan and List, increasing the match ratio does not seem to increase donations; rather, it is the presence of the match offer that affects the amount donated.

Receiving additional endowment money (from previous rounds) raises donations by around 16p per additional cedi, which is substantially lower than the overall mean donation. It is difficult to infer what donations would have been had the endowment been zero. However, one can use the additional endowment variable to construct an estimate of the income elasticity of donations with respect to the endowment. The mean estimate across all communities and rounds is 0.53, implying that increases in the endowment induce roughly a one-to-two proportional increase in the donation. This is about 10 times larger than the elasticity of donations with respect to wealth, suggesting that the propensity to give out of cash-in-hand is much higher than the propensity to give out of overall wealth.

2.7.2 Provision point mechanism

The introduction of the PPM in round 4 had a dramatic positive effect on donations. The round coefficients jumped from between 0.06 and 0.01 in the second and third rounds respectively (relative to round 1) to 0.56 and 0.66 in rounds 4 and 5. It appears that the PPM was much more effective than the matching ratio in eliciting contributions from community

[31] This figure is not drawn from Karlan and List's paper, but rather from my calculations based on their reported results and summary statistics. The two estimates are not perfectly comparable, since the elasticity from Karlan and List's study is a single elasticity at the mean donation, while the elasticity for my results is the mean of the individual elasticity estimates.
[32] Specifically, my calculations make it +0.07, but the coefficient estimate is not significantly different from zero.

members. The increase in donations in rounds 4 and 5 cannot be explained solely by the increase in the endowment, which doubled from round 1 to 2 with little effect on donations. The estimated coefficient for *extracash* suggests that only part of the two Ghana cedi increase in the endowment going from round 3 to round 4 (roughly 32p) could have been due to the additional endowment, leaving a net increase in donations of about 24p attributable to the PPM. This estimate is supported by the CDFs in Figure 2.2; whereas there was almost no change in the distribution of donations over the first three rounds of the experiment, donations in the last two rounds are stochastically dominant and significantly larger across the distribution. Increasing the endowment by 50 percent from round 4 to round 5 had only a small positive impact on donations.

As a robustness check, and in order to better isolate the impact of the PPM itself, I re-estimated the model without round effects and individual characteristics, but including the full endowment (which varied across rounds and within rounds, for those who missed an earlier payment) and a dummy for the PPM rounds. I experimented with first-, second- and third-order polynomials for the endowment, and found a quadratic specification worked best. This modified specification is as follows:

$$donation_{it} = \alpha + \sum_{j=2}^{5} \beta_j ratio_{it}^{j} + \gamma_1 endowment_{it} + \gamma_2 endowment_{it}^2 + ppm_t + \nu_i + \varepsilon_{it} \quad (2.3)$$

where *endowment* is the full endowment in Ghana cedis, and *ppm* is a dummy taking the value one in rounds 4 and 5 and zero otherwise. In addition to the fixed effects results, I report OLS and random effects estimates as well. The results are presented in Table 2.7. Donations are increasing in the square of the endowment, which suggests the marginal propensity to consume out of the endowment is *increasing*. The introduction of the PPM leads to an increase of between 29p and 33p in contributions, roughly 50 percent of the mean overall contribution and almost

100 percent of the mean contribution in rounds 2 and 3. The effect of the PPM is about three times that of the matching grant with a ratio of 2.[33]

Table 2.7: Estimates of Equation 2.3

	Fixed Effects		OLS		Random Effects	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Match ratio (0 omitted)						
0.5	0.025	0.032	0.017	0.033	0.021	0.030
1	0.078**	0.033	0.057*	0.034	0.068**	0.031
1.5	0.081**	0.032	0.099***	0.034	0.093***	0.031
2	0.066**	0.032	0.106***	0.033	0.086***	0.030
Endowment	0.064***	0.021	0.040*	0.021	0.046**	0.019
Endowment squared	0.004**	0.002	0.005***	0.001	0.005***	0.001
Log wealth	-0.027	0.025	0.058***	0.011	0.045***	0.013
PPM (Rounds 4 & 5)	0.290***	0.041	0.334***	0.045	0.315***	0.040
Constant	0.445**	0.181	-0.133	0.086	-0.043	0.101
N	2,070		2,070		2,070	
Groups	--		515		515	
R^2	0.353		0.372		0.374	

Notes: Dependent variable is donation in GH¢. Fixed and random effects are at the individual level. Robust standard errors reported for OLS. *** indicates significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level.

2.7.3 Social network characteristics

Table 2.8 reports coefficient estimates for a range of different social network measures, each included individually in an OLS estimation of Equation 2.2. The measures considered are the number of individuals in the sample whom the respondent knows personally, the number who report knowing the respondent personally, the number of the respondent's contacts she reports being able to trust with a valuable item, and the number of contacts who report being able to trust the respondent. Finally, I try the share of the respondent's contacts she trusts, and the

[33] As discussed earlier, the true effect of the match ratio may be greater than that estimated here if the act of offering a match is itself an incentive to contribute. All participants were aware that we were matching at least some contributions.

share who trust her. Trust is clearly an important correlate of donations. While the respondent's trust for her friends is positively related to donations, the coefficient estimate is only a fraction of the size of the coefficient on the number of friends who trust the respondent. Both the number of friends who trust the respondent, and the share, are significant at 5 percent. But since the number of friends varies a lot across individuals, is not normally distributed, and is not itself a predictor of donations, I choose to use the share of friends trusting the respondent in the other regressions in this paper.

Table 2.8: Coefficient estimates for social network variables

Variable	Coef.	Std. Err.
Number of sample members respondent knows	-0.000	0.000
Number of sample members who know respondent	0.000	0.000
Number of sample members respondent trusts	0.000**	0.000
Number of sample members who trust respondent	0.004***	0.001
Share of known sample members respondent trusts	0.048**	0.023
Sample members who trust respondent, as share of those who know respondent	0.757***	0.093

Notes: Each row reports the estimated coefficient on the respective social network variable when included individually as the variable *socnetwork* in Equation 2.2. Dependent variable is the estimated individual fixed effect from Equation 2.1. Other regressors in Table 2.6b were included, but are omitted here for parsimony. *** indicates significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level.

It is interesting that *trustworthiness* is the most significant predictor of an individual's contribution. An individual in the top decile in terms of trustworthiness (trusted by 45 percent of those who know her) would donate around 26p more than an individual in the bottom decile (trusted by only 11 percent of those who know her). This is more than one third of the mean overall donation. The number of friends is not significant, suggesting that it is not an individual's popularity alone that determines her donation.[34]

[34] This is true even if I use an intensity-weighted measure of friendship.

Is trustworthiness related to higher status in the village? If trustworthy people tend to be leaders, they may feel a duty to donate more because of their position. Such individuals might also have expected to lead the management of the public goods project, or felt responsible for the 'success' of their community's project, and therefore had the greatest interest in seeing it completed. On the other hand, trustworthiness may capture unobservable characteristics such as generosity, which has already been recognized by the respondent's friends. To address these questions, I include a number of measures of status in the regression: dummy variables for holding a village or family office, coming from the local ethnic group, having been fostered as a child, being a new migrant (defined as having lived in the community for five years or less), and the share of the individual's life spent in the community. If it is true that the effect of trustworthiness simply reflects the contributions behavior of higher-status individuals, one would expect village office-bearers to contribute significantly more. Ethnicity is a significant theme in research on community-driven development, thus we might expect people from the local ethnic group (Akwapim) to have a greater say (and possibly stake) in public projects and thereby contribute more. Conversely, new migrants to the community are likely to have less status. Previous research in these communities also suggests that individuals who were fostered (that is, lived a substantial part of their childhood with individuals other than their parents) are more likely to be socially isolated within the community (Vanderpuye-Orgle and Barrett, 2009) and therefore of lower status. These hypotheses are supported by simple regressions of trust on indicator variables of these three characteristics: office-bearers and Akwapim individuals are significantly more trusted, while new migrants and fostered individuals are significantly less trusted (as a share of those who know them). Both the number of individuals who know the respondent, and the number who trust the respondent, are higher the longer the respondent has

lived in the community.[35]

Coefficient estimates for these status variables are reported in Table 2.9. Office-bearers donate significantly more, but including this variable in the regression does not detract from the magnitude or significance of the coefficient on trustworthiness. Those who were fostered as children (presumably therefore of lower status) did not contribute significantly less. Individuals from the local ethnic group actually donated 7-8p less on average than others. New migrants donated around 7p more than others. Another measure of migrant status, the share of life spent in the village, also suggests that newer arrivals are more willing to contribute.

These are counterintuitive results. Perhaps they reflect a desire among new migrants to build their new community, or to gain acceptance by other residents.[36] It is also possible

Table 2.9: Coefficient estimates for status variables

	(1)	(2)	(3)
Share trusting respondent	0.808***	0.836***	0.896***
	(0.094)	(0.096)	(0.100)
Status variables			
Holds village/family office	0.095***	0.097***	0.100***
	(0.032)	(0.032)	(0.032)
Member of Akwapim group	-0.078***	-0.077***	-0.070***
	(0.019)	(0.019)	(0.018)
Fostered as child	0.004	0.000	-0.005
	(0.015)	(0.015)	(0.015)
New migrant (≤ 5 years in village)	--	0.066***	--
		(0.022)	
Share of life spent in village	--	--	-0.096***
			(0.022)
N	2,016	2,016	2,011
Adjusted R^2	0.256	0.258	0.261

Notes: Dependent variable is the estimated individual fixed effect from Equation 2.1. Other regressors in Table 2.6b were included, but are omitted here for parsimony. Robust standard errors reported in parentheses. *** indicates significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level.

[35] Results are available from the author on request.
[36] Around one quarter of respondents are first in their family to live in the community, reflecting quite high levels of geographic mobility.

that new migrants donate more because they have greater spending power; indeed, new migrants have higher per capita consumption on average. However, when I replace log wealth with log per capita consumption, the above results are unchanged. In conclusion, it appears that contributions to community-level public goods are strongly related to the social network, with more trusted individuals donating more. However, this does not appear to be due to status per se. The results from this analysis suggest that the relationship between ethnicity and community-level altruism is far from clear, and needs to be explored further in future work.

2.8 Policy implications

The mechanisms tested here – the matching grant and PPM – both helped to encourage donations and could be used in a full-scale local fund-raising initiative. With a PPM, unpopular projects that do not garner enough support to reach the fund-raising threshold would not go ahead, saving money and ensuring that scarce funds flow instead toward more desirable projects. I found that the PPM was between two and three times more effective than the matching grant in boosting donations, and has the added benefit of being easy to understand. However, the PPM requires fund-raisers to set a realistic target, which may be difficult if potential demand cannot be estimated ex ante. Setting too high a target and consequently aborting a project because the target is not reached could diminish goodwill within a community. One would also need to consider the administrative costs associated with recording donations and returning funds if the target is not met. In a developed country, a fund raiser could take credit card pledges and deduct the funds only if the target is met, but that is not feasible in poor rural communities.

The matching grant could be implemented indirectly if communities were required to contribute only a fraction – perhaps one-fifth – of the cost of the project. This would have the

same effect as a matching ratio of 4, reducing the effective price of donation but without needing to explain and co-ordinate the matching offer. The amount a community is required to raise could be varied depending on the standard of living of the community, with poorer communities required to raise a smaller fraction of the full project cost.

The practice of raising additional funds for local development from community members has a number of advantages. First, these individuals are rarely subject to income tax and therefore shoulder a very small tax burden. Some form of voluntary co-payment seems justified for public projects that offer direct benefits to the local community. The additional funds raised would allow district assemblies to do more with existing funds, and reduce their reliance on central government disbursements and irregular NGO and donor initiatives. Requiring local community members to bear part of the project cost could also increase their sense of ownership of the project and encourage them to take responsibility for its care and maintenance.

Some caveats apply to this analysis. The field experiment was designed to measure individuals' willingness to contribute to a public project. The focus on individual behavior, and the particular requirements of an experimental setting, means the design of the experiment is somewhat different from the process a district assembly might use to raise funds for a larger public project.

First, donations might have been lower had we not presented respondents with a cash endowment before soliciting contributions. Absent these endowments, more individuals may have refused to contribute because they were short of cash. They may also have been more inclined to contribute because of an 'endowment effect', feeling richer because of their endowment. We tried to offset this by framing the endowment as compensation for their participation in the household survey, and mentioning the payment again during the survey

interviews.

Second, the importance of status and social norms in these communities suggests that donations may have been significantly higher had the solicitations been public, subject to the influence of community leaders. Indeed, fundraising efforts in Ghanaian communities (such as church 'harvests') frequently raise amounts of money many times higher than those raised in this experiment. One important factor in such efforts is the involvement of outsiders connected to the community, such as family members overseas. If these sources could be harnessed, much more money could likely be raised.

Third, from our interactions with the respondents it was clear that contributions were strongly related to the popularity of the projects. We were limited by our budget and sample size to offering small projects. It is likely that contributions would have been much higher for more desirable and broadly beneficial projects like electrification and road building. However, it is hard to know whether one could raise a similar proportion of the total cost for such a project.

Finally, the results of this study relate to only four communities in one district of Ghana. It is possible that behavior might be qualitatively different in other parts of the country, let alone in other countries. Further research or trials need to be conducted before broadly implementing such a scheme as policy.

2.9 Conclusions

This chapter presented the results of an experiment designed to measure individuals' willingness to contribute to a local public good. I identified factors that explain why some individuals to give more than others, and tested two incentive mechanisms often used in fundraising activities. The study makes a number of novel contributions to the literature. It offers

evidence on the actual public goods contributions of individuals in a real-world developing country setting, relating to the financing of an actual public project. This is to my knowledge the first evidence on the effectiveness of the matching grant and PPM in a developing country, and the first comparison of the relative strengths of the two mechanisms in the field. By relating the results of the experiment to a rich dataset on individual characteristics and social networks, the study also sheds light on which individuals in the community are willing to contribute the most to public goods.

In these communities, the rate of contribution was high, but the size of the donations was small relative to the endowment. Older and male respondents donated more, but household wealth had only a small effect on donations. The strong effect of trustworthiness on donations is an interesting finding. Trusted members of the community were more inclined to give, even after controlling for wealth. But somewhat surprisingly, this result was not driven by status alone. Indeed, I found that new migrants to the community donated significantly more than non-migrants. Individuals from the dominant ethnic group actually contributed less than others. These results highlight the importance of the social network in determining individuals' willingness to contribute to their communities, reinforcing findings from previous research that social cohesion within communities is conducive to the success of community-led development projects. However, they also bring into question the notion that elites in the community have the most to gain (or capture) from public projects, and the assumption that ethnic homogeneity implies greater participation and success in such endeavors. Perhaps the answer lies somewhere in between: that there is a willingness on the part of minority ethnic groups to contribute to public goods, but generally poorer outcomes in the management of projects resulting from the effect of ethnic fractionalization on local political co-ordination.

I found that the provision point mechanism (PPM) had a significant impact on the size of donations, while the matching grant had a smaller but also significant effect. That these mechanisms are effective in boosting donations reinforces results from developed country field and laboratory experiments. However, I find that the match ratio has a greater effect in Ghanaian rural communities than has been measured in other places. The broad willingness of individuals to contribute to community projects suggests policy makers may be able to use such contributions to augment funding for community construction projects. The results from the experiment indicate that the PPM and matching ratio could both be very effective in encouraging donations for such a program.

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CHAPTER THREE

Consumption, Investment and Transfers in Village Social Networks

3.1 Introduction

An extensive literature documents the prevalence and effectiveness of informal insurance arrangements in traditional communities. These arrangements, governed by long-standing social norms about sharing and mutual support, are relied upon to fill gaps in the formal safety net and substitute for missing insurance and credit markets. The overwhelming conclusion from the literature is that informal insurance arrangements provide some support to individuals in times of need, but fall short of providing full insurance against idiosyncratic shocks to income (Rosenzweig and Wolpin, 1993; Townsend, 1994; Fafchamps et al., 1997; Kazianga and Udry, 2006). The laudable benefits of informal sharing norms may come at a cost, however. Individuals may be discouraged from becoming 'too successful', or be constrained in their income mobility by a social obligation to share their wealth with others. These pressures may affect economic incentives in a number of ways, yet there is scant empirical evidence on this point. In particular, it is unclear from existing research how sharing obligations affect individuals' incentives to save and invest. This is of great importance to development, given that investment is commonly seen as one of the primary vehicles, along with technical change and market exchange, by which individuals can transition into higher-return activities and thereby permanently escape from poverty.

The sharing norms underpinning informal insurance arrangements could plausibly result in either underinvestment or overinvestment. There is no clear-cut empirical evidence as to which

view is correct. Platteau (2009) argues that informal insurance arrangements and social norms in developing countries can hinder entrepreneurial activity and investment if individuals expect their gains to be expropriated by the claims of friends or family. Central to his thesis is the observation that

> "..lineage-based societies such as those found in [sub-Saharan Africa] have adopted strong redistributive norms that enjoin economically rising individuals to share their surplus with their kith and kin. These norms are backed by the belief that success is due to 'luck' rather than to personal effort, risk-taking and talent." (Platteau, 2009, p. 679).

Platteau goes on to say that one-off success is generally accepted by others as part of the normal course of events, but that runs of good luck can be interpreted negatively. In such cases, refusing to share one's gains with the community can spark accusations of witchcraft, resulting in social sanction and sometimes longer lasting social exclusion. If individuals bear the full marginal cost of investment but only reap part of the marginal benefit, they will maximize their utility by investing at a suboptimal level. Thus such norms impose a 'social rate of taxation' on investment and risk-taking, discouraging entrepreneurs from investing and building their businesses. Furthermore, these obligations may distort other behavior such as intertemporal consumption decisions. Goldberg (2010) argues that individuals may be inclined to spend publicly observed windfall gains faster than those which are not publicly observed, if the knowledge of a windfall causes others to demand that the recipient share his gains.

Recent empirical research provides circumstantial evidence to support this hypothesis. Baland, Guirkinger and Mali (2007) find that members of savings co-operatives in Cameroon are prepared to take out unneeded loans in order to maintain a façade of poverty and thereby evade requests for assistance. Comola and Fafchamps (2010) model link formation in Tanzanian villages and find evidence consistent with gift exchange links being unilaterally rather than bilaterally initiated; in other words, gift exchange for these individuals is an obligation rather

than the outcome of a voluntary contract. In a lab experiment in rural Kenya, Jakiela and Ozier (2011) found that individuals were 22 percent less likely to make a profitable investment if the returns from that investment were to be announced publicly, and were willing to forgo 15 percent of the investment's returns in order to keep the outcome private. However, these results were significant only for women in their sample, and may be capturing women's desire to conceal their earnings from their husbands rather than from others in their social network. It is unclear whether the same results would also hold at the household level. Goldberg (2010) finds experimental evidence from Malawi that winners of publicly received prizes spent their windfall faster than winners of privately received prizes, although in the long run the amount spent by both types of prize-winners was the same. However, her conclusions relate to the amount spent in the week following the experiment, using recall data from a follow-up survey conducted three months later, and administered to only a subset of her original sample. It seems likely that respondents would have had difficulty recalling the exact timing of expenditures three months in the past.

On the other hand, individuals may be inclined to invest *more* than the optimal amount in illiquid assets if doing so helps them avoid honoring claims from others in their social network (Besley, 1995). For example, in many developing countries individuals will invest in housing even if they cannot complete the building, preferring to hold their assets in the form of an uncompleted house (with little or no real return) rather than in cash or liquid investments. Udry (1990, 1994) observed that individuals in northern Nigeria preferred to give assistance to others in the form of flexible, interest-free loans rather than cash gifts, since the former can be claimed back later in a time of need – once again, a somewhat illiquid investment that maintains assets in a form that is out of the reach of others. If illiquid assets are truly difficult for kin and neighbors

to expropriate, they may be a relatively more attractive store of wealth for individuals who are subject to sharing obligations.

In this paper we test these competing predictions about the effect of windfall gains on investment and consumption using data from a field experiment that was designed to generate precisely the 'luck-induced' windfalls Platteau (2009) describes. In the first section of the paper, we develop a model that captures the effect of social obligations on individual consumption and investment decisions. This formalizes the predictions of the social pressures identified by Platteau and others, and renders them testable using our experimental data. Our model unites two strands of literature that have hitherto remained reasonably distinct: the literature stemming from Deaton (1991) and Carroll (1997) on buffer stock and precautionary savings; and the literature on informal insurance arrangements. Both provide partial insurance against income shocks, but against shocks that are partly orthogonal. Informal insurance arrangements within a small community can in theory fully smooth consumption against idiosyncratic (i.e., individual- or household-specific) shocks, while buffer stock savings partly smooth consumption against both idiosyncratic and covariate shocks. A vast literature on the subject presents evidence that both approaches are used (to varying extents) by rural households in developing countries.

In order to understand the investment and savings behavior of such individuals, it is appropriate to start with a framework that combines the buffer stock and coinsurance models. The only paper we have found that even tangentially attempts to do so is that of Ligon, Thomas and Worrall (2000), who discuss the impact of a 'storage possibility' on the welfare of individuals engaging in coinsurance with limited commitment. However, their focus is on the general sustainability of coinsurance contracts in light of savings, rather than the impact of coinsurance obligations on savings behavior. The model we develop here shows how an

individual's marginal propensities to consume, save and invest out of income may depend on the degree to which they are involved in coinsurance with their neighbors, and also on initial conditions such as wealth. Our model demonstrates how individuals' coinsurance obligations may distort their incentives to invest, but goes further in explaining how these distortions are magnified as an individual's coinsurance network expands, and moreover how these distortions may vary depending on an individual's relative wealth in their social network. From the model we develop a set of testable hypotheses about the effect of unanticipated positive income and asset shocks on consumption, savings in liquid assets, and investment in illiquid assets.

In the second part of the paper we test these hypotheses using data from a unique, year-long field experiment conducted in conjunction with a longitudinal household survey in four villages in southern Ghana. Four times during 2009, we held a lottery in each of the four villages and allocated 20 cash and livestock prizes at random among the household survey respondents. Half of the prizes were awarded in a public draw, the other half in private draws. We model the impact of these idiosyncratic, unanticipated shocks on consumption, savings and investment, and test the predictions of our theoretical model. Our findings speak to the relative efficacy of competing aid philosophies: is it better to give the poor a goat to breed, or cash with which to buy one? How well are untargeted transfers redistributed through the village social network to those who need them most? Our experiment improves on those conducted previously by Goldberg (2010) and Jakiela and Ozier (2011), because of our larger sample, multiple experimental rounds and longitudinal household survey data collected in tandem with the experiment. With richer data, we are also able to examine the effects of prize winning in more detail, by varying the size and types of prize given, and relating consumption, investment and transfer responses to the characteristics of individuals' social networks.

We find that much of the prize money was spent or invested within the month following the lottery. Animal prizes were treated very differently from their cash counterparts, highlighting the inapplicability of a strict notion of fungibility in this rural setting. We use the distinction between public and private prizes to test whether sharing of prizes was voluntary or coerced. In contrast to the predictions of a model of social coercion, we find little evidence of sharing of prizes, public or private. There was no statistically significant difference in the amount of sharing from public versus private prizes. We also find compelling evidence of an 'investment trap', wherein relatively rich individuals face a higher social rate of taxation on their income and are thereby discouraged from making productive investments. Both cash and livestock prizes induced significant increases in households' illiquid asset stocks, but none of these increases were observed among households whose members were relatively richer than the median household in their social network. This suggests that relatively rich households are discouraged from investing because they predict the likely returns will be eroded by future claims from others in their social network. As our model predicts, this effect is more pronounced as the size of a household's social network increases. Households with a larger social network invest more if they are relatively poorer than their peers, and less if they are relatively richer.

In the next section, we develop a theoretical model of buffer stock savings and coinsurance in a social network setting, and discuss the model's predictions for consumption and investment decisions. In Section 3.3 we describe the household survey and social network data used in the empirical analysis. Section 3.4 describes the experiment we designed to allocate income and asset shocks randomly among survey respondents. As a background to the formal econometric analysis, we provide a brief qualitative overview of the results of the experiment in Section 3.5. In Section 3.6, we present an econometric analysis of the results. We discuss the policy

implications of the results in Section 3.7, and Section 3.8 offers concluding remarks.

3.2 A model of buffer stock savings and coinsurance

We motivate our analysis with a stochastic dynamic programming model of investment and consumption for an individual facing borrowing constraints. This model captures the pervasive lack of access to credit facing rural Ghanaian households. We adapt the buffer stock model developed by Deaton (1991). In Deaton's framework, an individual who can save but cannot borrow chooses how to allocate her wealth between consumption and savings in a liquid (one-period) asset with a fixed yield. Deaton showed that in such a case the individual will save an increasing fraction of her income above some threshold as a buffer against future shocks. We first extend Deaton's model to allow for two assets – one liquid, and one illiquid. We solve this autarkic case and discuss how an individual's marginal propensities to consume, save and invest vary as wealth increases. We then examine the effects on these propensities of introducing a coinsurance obligation, and explore how the structure of the social network modifies behavior.

3.2.1 The autarkic case

We consider the decision problem for a risk-averse, expected-utility maximizing individual with a concave utility function $U(c)$ defined over composite consumption, c, and a discount parameter $\beta < 1$. The individual has the ability to store wealth in assets between periods, but does not have the ability to borrow. (One can alternatively read 'household' for 'individual' in what follows, provided one assumes that the household acts as a unitary decision maker.) The individual can allocate her wealth to two distinct assets: a liquid asset, S, with a per-period yield of r_s, and an illiquid asset A, with a per-period yield of r_a. The liquid asset is essentially a one-

period security; it can be converted into consumption at any time. In contrast, the illiquid asset is held indefinitely, and must be sold in order to be consumed.

We impose illiquidity by assuming that the sale of the illiquid asset incurs transaction costs, namely that the money raised by selling A is only qA, where $q < 1$. Furthermore, the illiquid asset depreciates at rate $\delta < 1$ each period. We will distinguish between the stock of the illiquid asset, A, and the flow of funds into or out of the asset, a. Thus $A_{t+1} = (1-\delta)A_t + a_t$. In order to clearly distinguish the acts of storage in the liquid and illiquid assets, we shall refer to purchases of the liquid asset as 'saving' and purchases of the illiquid asset as 'investing'.

The individual's cash on hand in period t+1 is therefore:

$$x_{t+1} = (1 + r_s)S_t + r_a A_{t+1} + y_{t+1}, \tag{3.1}$$

where y_{t+1} represents the period-specific exogenous income flow. It is assumed in the first section of Deaton's paper (and here throughout), that income draws are normally distributed with mean μ and constant standard deviation σ, and are independent over time.[37] Since the individual must consume, save or invest all cash on hand, we must have

$$x_t = c_t + S_t + \theta(a_t), \quad \text{where } \theta(a_t) = \begin{cases} a_t & \text{if } \quad a_t \geq 0 \\ qa_t & \text{if } -A_t \leq a_t < 0 \end{cases} \tag{3.2}$$

Note that a_t (which captures flows into or out of the stock of illiquid assets) may be positive or negative (provided $A_t > 0$). The function $\theta(a)$ captures the discontinuity in buying and selling the illiquid asset. The individual must pay full price to buy the asset, but incurs transaction costs by selling it. Using (3.2) we can eliminate S_t from (3.1), so that

$$x_{t+1} = (1 + r_s)(x_t - c_t - \theta(a_t)) + r_a A_{t+1} + y_{t+1}. \tag{3.3}$$

[37] This is a somewhat extreme assumption in the case of farmers in Ghana, whose incomes are probably highly correlated over time. Deaton (1991, pp. 1231-35) also considers the case in which income streams are serially correlated. He shows that the ability to smooth consumption is diminished when incomes are serially correlated, and that in such a situation individuals will consume more in high-income states and less in low-income states. Since our econometric analysis relates to experimentally random income shocks, however, we maintain the assumption of independent shocks here.

The consumer's decision problem is thus to choose the optimal consumption and investment profiles c^* and a^* (and, implicitly, S^* as the residual) to maximize discounted expected utility over the planning horizon:

$$\max_{\{a_{t+j},c_{t+j}\}_{j=0}^{\infty}} \sum_{j=0}^{\infty} \beta^j EU\big(c_{t+j}\big)$$

$$\text{s.t.} \quad x_{t+j} \geq c_{t+j} + \theta\big(a_{t+j}\big)$$

$$a_{t+j} \geq -(1-\delta)A_{t+j}.$$

Without borrowing constraints (and assuming no asset investment), Deaton (1991) shows that the interior solution to the optimization problem satisfies a standard Euler equation:

$$\lambda(c_t^*) = \beta E_t \lambda(c_{t+1}^*),$$

where $\lambda(c_t) = U'(c_t)$. However, in the presence of a borrowing constraint liquid assets cannot be negative, so the marginal utility of consumption must be bounded from above at $\lambda(x_t)$. Thus, the constrained solution is

$$\lambda(c_t^*) = \max\{\lambda(x_t), \beta E_t \lambda(c_{t+1}^*)\}.$$

Deaton then defines $c_t^* = f(x_t)$ and $p(x_t) = \lambda[f(x_t)]$, and eliminates c from the above result, yielding the optimality condition:

$$\begin{aligned} p(x_t) &= \max\{\lambda(x_t), \beta E_t p(x_{t+1})\} \\ &= \max\big\{\lambda(x_t), \beta E_t p\big[(1+r_s)\big(x_t - \lambda^{-1}p(x_t)\big) + y_{t+1}\big]\big\} \\ &= \max\big\{\lambda(x_t), \beta \textstyle\int_0^{\infty} p\big[(1+r_s)\big(x_t - \lambda^{-1}p(x_t)\big) + y_{t+1}\big]dF(y)\big\}. \end{aligned}$$

He then solves iteratively for the functional $p(x)$ that satisfies this condition.

With a second, illiquid asset, the problem becomes more complex. First, we must modify the mapping from x_t into c_t^* to also depend on the asset stock at time t,

$$c_t^* = f(x_t, A_t),$$

and define the function $p(x_t, A_t) = \lambda[f(x_t, A_t)]$. Analogous to Deaton's result, it must be the

case that

$$p(x_t, A_t) = \max\{\lambda(x_t, A_t), \beta E_t p(x_{t+1}, A_{t+1})\},$$

where $\lambda(x_t, A_t) = U'(x_t + qA_t)$, since the agent will sell all of her assets in a time of need. Substituting for x_{t+1} from (3.3), we then have

$$\begin{aligned} p(x_t, A_t) &= \max\left\{\lambda(x_t, A_t), \beta E_t p\{(1 + r_s)(x_t - \lambda^{-1}[p(x_t, A_t)] - \theta(a_t)) + r_a A_{t+1} + y_{t+1}, A_t\}\right\} \\ &= \max\left\{\lambda(x_t, A_t), \beta \int_0^\infty p\{(1 + r_s)(x_t - \lambda^{-1}[p(x_t, A_t)] - \theta(a_t)) + r_a A_{t+1} + y_{t+1}, A_t\} dF(y)\right\} \end{aligned} \tag{3.4}$$

To find a_t, note that the discounted marginal utility of investment in the illiquid asset (in the form of future interest payments and returns on divestment) must offset the marginal utility sacrificed by investing in the current period. Let the discounted future value of the investment be defined by the value function $W(x_t, A_t, a_t)$. First, consider the stream of income in period t+1 resulting from investing $a_t > 0$ at time t. The individual will receive interest of r_a per unit, and can redeem qa_t at a subsequent date by selling the asset. If she does not sell the asset, she retains the incremental investment, less depreciation, in period t+2. The states of selling or not selling the asset at t+1 are governed by the realization of her income in period t+1. If income is low enough that $p(x_{t+1}, A_{t+1}) \leq \lambda(x_{t+1}, A_{t+1})$, she will sell her assets in order to increase consumption as much as possible. Let $\underline{y}$ be the level of income at which $p(x_{t+1}, A_{t+1}) = \lambda(x_{t+1}, A_{t+1})$. Then the function W is defined by the following Bellman equation:

$$\begin{aligned} W(x_t, A_t, a_t) = \beta \int_{\underline{y}}^\infty r_a [p(x_{t+1}, A_{t+1}) + W(x_{t+1}, (1 - \delta)A_t + a_t, a_{t+1})]\, dF(y) \\ + \beta \int_0^{\underline{y}} (q + r_a)\lambda(x_{t+1}, A_{t+1})\, dF(y) \end{aligned} \tag{3.5}$$

where $x_{t+1} = (1 + r_s)(x_t - \lambda^{-1}[p(x_t, A_t)] - \theta(a_t)) + r_a A_{t+1} + y_{t+1}$.

The equilibrium condition is to continue purchasing (or selling) a_t until the marginal utility

of an extra dollar spent (or received from sale) equals the marginal value W found above. Thus,

$$W(x_t, A_t, a_t^*) \leq p(x_t, A_t), \quad \text{for all } a_t^* \geq 0. \tag{3.6}$$

$$W(x_t, A_t, a_t^*) \geq qp(x_t, A_t), \quad \text{for all } -A_t \leq a_t^* < 0. \tag{3.7}$$

Equation (3.7) results because the sale of A yields only q dollars per unit, so the marginal utility gained from selling a unit of the asset is only $qp\ (x_t\ ,\ A_t)$ Thus there is a range of values of W for which $a_t^* = 0$. This discontinuity arises from the transaction cost associated with disposing of the illiquid asset, as discussed by Grossman and Laroque (1990).

We solve the model by first finding the W function, conditional on a guess for p. The optimal amount to be invested in (or divested from) the illiquid asset is then the value a_t^* that solves (3.6) and (3.7). This is a function of x_t and A_t, hence we will write it as $a^*(x_t\ ,\ A_t)$. The equilibrium condition is:

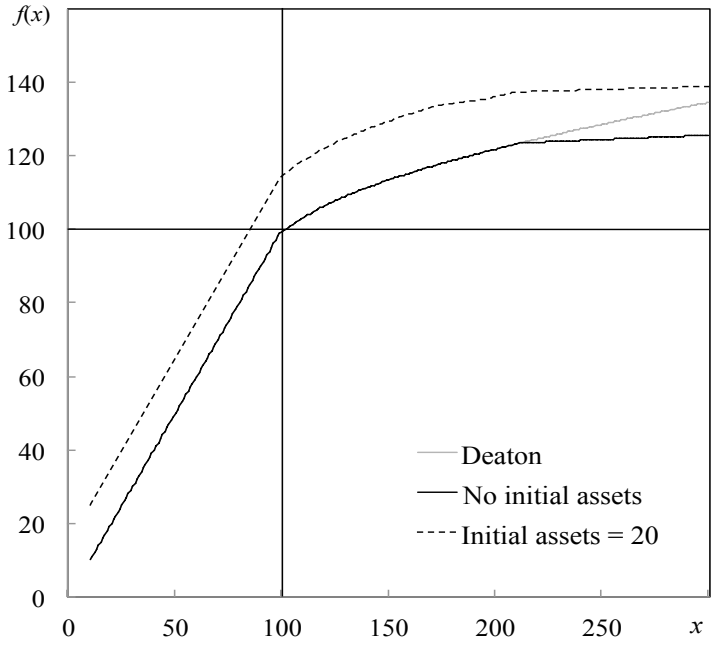
$$qp(x_t, A_t) \leq W(x_t, a^*(x_t, A_t), A_t) \leq p(x_t, A_t). \tag{3.8}$$

We then use the function $a^*(x_t\ ,\ A_t)$ to solve for the function $p\ (x_t\ ,\ A_t)$, and then obtain the consumption function as $f\ (x_t\ ,\ A_t) = \lambda^{-1}[p\ (x_t\ ,\ A_t)]$.

The solution for this model can be found by backward induction, starting with $p_0(x_t\ ,\ A_t) = \lambda(x_t\ ,\ A_t)$, solving for a^*, then for p, and iterating until both functions converge (similar to the procedure used in Deaton, 1991, p. 1227). In Figure 3.1 we present the consumption functions for the utility function $U(c) = \frac{c^{1-\rho}}{1-\rho}$, with $\rho = 2$, initial assets $A_t = 0$ and $A_t = 20$, $r_a = 0.15$, $r_s = 0.05$, $\mu = 100$, $\sigma = 10$, $\delta = 0.05$ and $q = 0.75$. Deaton's solution (using the same utility function and parameters, but with no illiquid asset) is included in the figure for comparison.[38]

[38] The calculations for Deaton's model were done by the authors using an independently written program.

Figure 3.1: Consumption functions for autarkic model

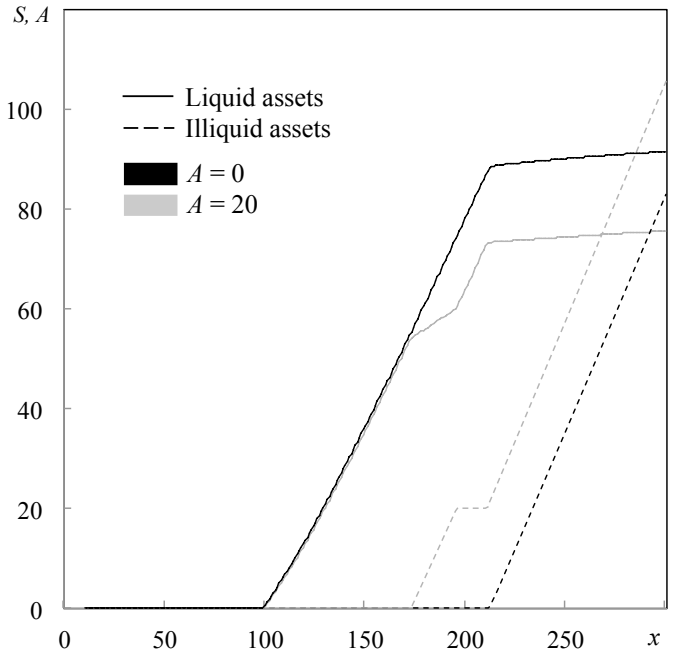


Note that the individual consumes the entire stock of liquid assets when x falls below the mean income level of 100, and saves an increasing fraction of the stock when x is above 100. For high levels of income, the marginal propensity to consume becomes very small. Keeping a buffer stock of liquid assets also serves to reduce the future variance of consumption. When x is less than mean income, however, the individual is better off consuming everything, and absorbs income shocks one-to-one by adjusting consumption. This limited ability to smooth consumption over time provides scope for gains from coinsurance, whereby individuals with incomes that are not perfectly correlated can also smooth consumption interpersonally. The consumption function for the model with illiquid assets and $A = 0$ is essentially identical to the function from Deaton's model, up to $x = 210$. At this point, the individual in our model starts to purchase the illiquid asset, and draws part of the funds for this from consumption. Having the ability to buy an illiquid asset thus yields an even flatter consumption profile at very high levels of wealth. Holdings of

illiquid assets raise consumption in subsequent periods, a manifestation of the permanent income hypothesis. Indeed, unless x is quite large in the next period, the consumer will sell the illiquid asset and consume it. Thus when initial illiquid assets are positive (the $A = 20$ case), the model predicts that consumption will shift up almost uniformly, regardless of x.

Figure 3.2 shows the consumer's optimal stock of liquid and illiquid assets given x_t, for initial illiquid asset stocks of 0 and 20. Note that the consumer will only acquire liquid assets above $x = 100$, and illiquid assets only above $x = 210$. The acquisition of the illiquid asset partly displaces savings in liquid form (which appear to level off). For the $A = 20$ case, note the flat section around $x = 200$. This arises because of the transaction costs in selling the illiquid asset; the consumer is indifferent between buying and selling over a small range of x at this point.

Figure 3.2: Liquid and illiquid asset accumulation for autarkic model



What this model illustrates so far is that (i) individuals will rationally purchase illiquid assets, even at reasonably low yields and with depreciation and transaction costs; (ii) such purchases occur only when buffer stocks of liquid assets are high; (iii) having a greater range of choice over asset types gives individuals more scope to smooth consumption; and (iv) the marginal propensities to save in liquid and illiquid assets are reasonably constant, except at breakpoints. Thus we expect marginal propensities to vary significantly for individuals with different initial levels of liquid assets.

3.2.2 Coinsurance

We now extend the model by introducing a coinsurance obligation. Households in developing countries both save on their own and look to others to assist in times of particular need, yet theoretical models incorporating both activities are remarkably scarce in the literature. We motivate our discussion with the seminal models of Kimball (1988) and Coate and Ravallion (1993), which characterize the set of Pareto optimal transfers between two individuals seeking to maximize their ex ante welfare. We extend this model to include an illiquid asset, A, which may or may not be productive (in the sense that it increases disposable income, x). We show how the model predicts that the social rate of taxation (increase in transfer burden) of consumption and investment may vary across individuals depending on their initial wealth.

The seminal mutual insurance problem (Kimball, 1988; Coate and Ravallion, 1993) is for two risk-averse, expected utility-maximizing individuals i and j to negotiate an ex ante contract wherein some net (positive or negative) amount τ_{ij}^{ω} is transferred from i to j in every state of nature $\omega \in \Omega$. Doing so increases their ex ante expected utility. The set of feasible transfers is bounded by sustainability constraints, which require that in every state both individuals are better

off, in terms of discounted expected lifetime utility, from adhering to the contract rather than reneging. We consider a twist to the model, wherein utility depends on liquid and illiquid assets, and only the former are transferable.

Reflecting the consumer's optimization problem in (3.4), we define $V(x_t, A_t) = U[f(x_t, A_t)]$ as the value function of liquid and illiquid assets at the start of period *t*. Inheriting the properties of *U*, this value function is concave in both arguments and twice continuously differentiable in *A* for all $A \in \mathbb{R}^+$, and in *x* over the range (μ, ∞). Recall that there is a breakpoint at $x = \mu$, below which individuals consume all of their cash on hand and save nothing. Individuals gain utility from their stock of illiquid assets even though these are not directly consumable, since the asset generates interest and can be sold (at a discount). Depending on the utility function, the asset may also augment consumption directly in some way, for instance by serving as a complement or substitute to consumption goods. Suppose that the history of states to time *t* is h_t. Let $\pi(\omega|h_t)$ be the probability of state ω given h_t. The optimal contract between two individuals *i* and *j* is then to find the transfer from liquid assets in each state ω over an infinite horizon that solves the programming problem:

$$\max_{\tau_{ij}^{\omega}} \left\{ \theta V\left(x_i^{\omega} - \tau_{ij}^{\omega}, A_i^{\omega}\right) + (1-\theta) V\left(x_j^{\omega} + \tau_{ij}^{\omega}, A_j^{\omega}\right) \right\} \tag{3.9}$$

$$\text{s.t. } \sum_{k=0}^{\infty} \beta^k \sum_{\varphi \epsilon \Omega} \pi(\varphi|h_{t+k}) V(x_i^{\varphi} - \tau_{ij}^{\varphi}, A_i^{\varphi}) + B_{it}^{\omega} \geq \sum_{k=0}^{\infty} \beta^k \sum_{\varphi \epsilon \Omega} \pi(\varphi|h_{t+k}) V(x_i^{\varphi}, A_i^{\varphi})$$

$$\sum_{k=0}^{\infty} \beta^k \sum_{\varphi \epsilon \Omega} \pi(\varphi|h_{t+k}) V(x_j^{\varphi} + \tau_{ij}^{\varphi}, A_j^{\varphi}) + B_{jt}^{\omega} \geq \sum_{k=0}^{\infty} \beta^k \sum_{\varphi \epsilon \Omega} \pi(\varphi|h_{t+k}) V(x_j^{\varphi}, A_j^{\varphi})$$

where θ is the bargaining weight for person *i*. The (nonnegative) *B* terms in the participation constraints are sanctions for deviation from the contract. In Coate and Ravallion's model these are zero, but Ligon, Thomas and Worrall (2002) show that introducing such a term expands the set of contractible states.

Letting ψ_i and ψ_j be the Lagrange multipliers on the two participation constraints, it is

straightforward to derive the solution for the transfer in any state, τ_{ij}:

$$(\theta + \psi_i)V_1\big(x_i - \tau_{ij}, A_i\big) = (1 - \theta + \psi_j)V_1(x_j + \tau_{ij}, A_j) \tag{3.10}$$

where V_1 is the first derivative of V with respect to the consumption good. Transfers are bounded at the level where the participation constraints bind; on the positive side where $\psi_i > 0$, and on the negative side where $\psi_j > 0$.

At an interior solution, (3.10) implies that the transfer is chosen in each state so that the ratio of the marginal utilities of consumption of the two individuals equals the ratio of their bargaining weights. Note that in this modified version of the standard model, at an interior solution with equal bargaining weights, transfers do not necessarily equate post-transfer wealth, but only post-transfer marginal utilities of consumption.[39]

In the standard one asset model with identical individuals and $\theta = \frac{1}{2}$, increases in x (due perhaps to good luck) must be shared equally with all members of the network. Everyone consumes network mean consumption. No one has an incentive to save or invest unless it increases network mean consumption. But in a two asset model, this may not be the case. Consider the effect of an increase in the illiquid assets, A, of person i on the interior solution to τ_{ij}. By the Envelope Theorem, we can differentiate (3.10) with respect to A_i to obtain:

$$\frac{d\tau_{ij}}{dA_i} = \frac{\theta V_{11}^i(x_i - \tau_{ij}, A_i)\frac{\partial x_i}{\partial A_i} + \theta V_{12}^i(x_i - \tau_{ij}, A_i)}{\theta V_{11}^i(x_i - \tau_{ij}, A_i) + (1-\theta)V_{11}^j(x_j + \tau_{ij}, A_j)}. \tag{3.11}$$

The size of the transfer response depends on the sizes of V_{11} and V_{12}, the derivatives of the marginal utility of consumption with respect to x and A. The sign of the response depends on the derivative V_{12}. This captures the response of marginal utility of consumption to an increase in

[39] Given the discontinuity in the consumption function f in the buffer stock model, there is a boundary case where $x_i - \tau_{ij} \leq \mu$. Over this range the marginal utility of x is constant and the transfer rule may not be at an interior solution.

holdings of the investment good. If V_{12} is positive, increased investment in A raises the marginal utility of consumption. In this case, the investment good is a complement to the consumption good; increased investment makes consumption more attractive. This might be the case, for instance, if the investment good is livestock that requires food and water to survive. If V_{12} is negative, increased investment in A decreases the marginal utility of consumption. In this case, the investment good is a substitute to consumption, such as a vehicle which decreases the household's demand for public transport.

While $x_i - \tau_{ij} \leq \mu$, there is no transfer response to changes in A. The simulations from the two asset buffer stock model, which assume A is neither a complement nor a substitute ($V_{12} = 0$), show no relationship between A and the marginal utility of x. In that case, the transfer response to increased illiquid wealth will be negative and identical for all villagers. As individuals hold larger private buffer stocks, those displace coinsurance payments as a means of coping with idiosyncratic income shocks.

If A is a substitute for consumption ($V_{12} < 0$), the transfer response is the ratio of two negative quantities, and therefore positive. Increased illiquid wealth holdings stimulate transfers. If x and A are complements ($V_{12} > 0$), V_{12} may offset V_{11} and the transfer response may be either negative (implying that transfers decrease as A increases) or positive. Differences in the stock of illiquid assets across individuals (relative wealth) imply differences in transfer responses across individuals. This requires that V be thrice differentiable, as is the case for prudent individuals (Kimball, 1988; Carroll, 1997) and provided x lies in the range (μ, ∞).

The response of transfers to increases in x is analogous:

$$\frac{d\tau_{ij}}{dx_i} = \frac{\theta V_{11}^{i}(x_i - \tau_{ij}, A_i) + \theta V_{12}^{i}(x_i - \tau_{ij}, A_i)\frac{\partial A_i}{\partial x_i}}{\theta V_{11}^{i}(x_i - \tau_{ij}, A_i) + (1-\theta) V_{11}^{j}(x_j + \tau_{ij}, A_j)}.$$

This effect is also positive for individuals with concave utility functions, and will vary across individuals if A is a substitute or complement. Again, this is an interior solution only; when $x_i - \tau_{ij} \leq \mu$, transfers do not respond to changes in x. By similar reasoning to that above, we can sign the derivatives, finding that the rich face a higher rate of taxation than the poor on increases in x if A is a complement ($V_{12} > 0$), and a lower rate of taxation if it is a substitute ($V_{12} < 0$).

To get an intuitive sense of how illiquid wealth affects the transfer response, consider two alternative utility functions of x and A: a Cobb-Douglas utility function,

$$\tilde{U}(x, A) = x^{\alpha} A^{\beta}$$

in which x and A are complements, and the function

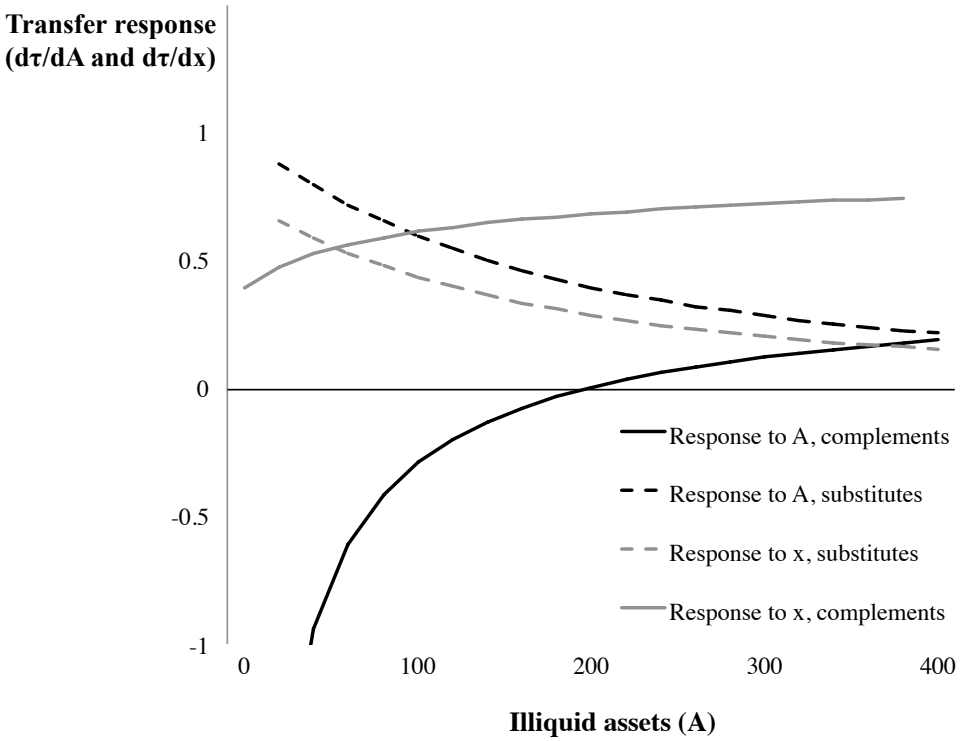
$$\tilde{V}(x, A) = (x + A)^{\alpha}$$

in which x and A are perfect substitutes. We assume $\alpha, \beta < 1$. In Figure 3.3, we graph the transfer responses for the two functions to changes in x and A, assuming in each case identical utility functions for both individuals and equal transfer weights. The monthly return on assets for person j is held constant at 50 (which reflects an annual rate of return of 25% on an asset stock of 200) and the return for i varies along the horizontal axis. We assume x is equal to 100 for both individuals.

In Figure 3.3, it can be seen that the transfer responses to investment in liquid or illiquid assets are increasing in wealth when the illiquid asset is a complement to consumption (the solid lines), and decreasing in wealth when the illiquid asset is a substitute to consumption (the dotted lines). For the relatively poor (in the example, those with $A < 200$), the net transfer burden *decreases* (i.e., net transfers received increase) as A increases. In this case, raising the assets of the relatively poor actually *crowds in* private transfers. For relatively wealthier individuals,

however, an increase in A causes the net transfer burden to increase, as per the usual crowding out hypothesis.

Figure 3.3: Response of transfers to investment



This example demonstrates how different the social rates of taxation (the additional amount of x shared out of a unit increase in A) are for the two types of illiquid asset, and how these change with wealth. The difference between rich and poor is driven by the curvature (specifically, the third derivative) of the utility function. For complementary investment goods, which increase the marginal utility of consumption for the investor, wealthier individuals are taxed for their investments, and the rate of taxation rises as their relative wealth rises. For substitute investment goods, which decrease the marginal utility of consumption, poorer households are more heavily taxed. This latter result is made stronger by our assumption that x and A are perfect substitutes, but even for weaker substitutes an increase in A displaces x so that

marginal utility falls; thus the net transfer burden on the investor rises to offset their decreased marginal utility.

The main results from this model are that: (i) investment incentives may be heavily distorted by transfer obligations; (ii) these distortions vary depending on the type of investment good; and (iii) the distortions depend nontrivially on relative initial wealth. Specifically, if individuals are prudent, so that the third derivative of V is positive, then the response of transfers will be higher for wealthier individuals with respect to complements, and lower with respect to substitutes.

The above results are weakened if i's coinsurance participation constraint is binding when she makes the investment. In that situation, the change in transfers is bounded by the change in the participation constraint stemming from the gain in income. Let τ_{ij}^* be the transfer amount at which the constraint is binding. Then by rearranging the first constraint in (3.9) and using EV as shorthand notation for the expected utility summations, τ_{ij}^* is defined implicitly as:

$$EV(x_i - \tau_{ij}^*, A_i) + B_i = EV(x_i, A_i) \tag{3.12}$$

Taking the derivative of (3.12) with respect to A_i, we have

$$\frac{d\tau_{ij}^*}{dA_i} = EV_1\left(x_i - \tau_{ij}^*, A_i\right)^{-1}\left\{\left[EV_1\left(x_i - \tau_{ij}^*, A_i\right) - EV_1(x_i, A_i)\right]\frac{\partial x_i}{\partial A_i} - \left[EV_2\left(x_i - \tau_{ij}^*, A_i\right) - EV_2(x_i, A_i)\right] + \frac{\partial B_i}{\partial A_i}\right\},$$

and with respect to x_i,

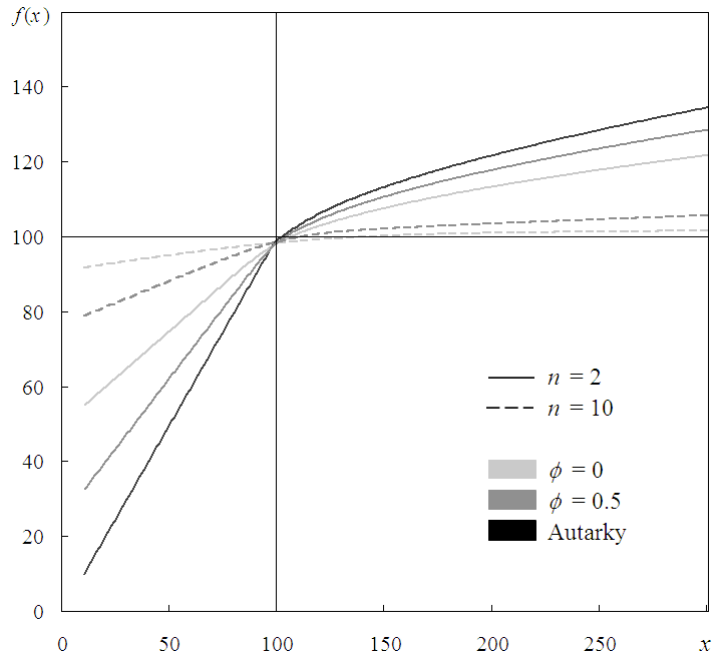
$$\frac{d\tau_{ij}^*}{dx_i} = EV_1\left(x_i - \tau_{ij}^*, A_i\right)^{-1}\left\{\left[EV_1\left(x_i - \tau_{ij}^*, A_i\right) - EV_1(x_i, A_i)\right] + \frac{\partial B_i}{\partial A_i}\right\}.$$

In the case of the investment decision, expected utility must increase as a result of the investment for it to be attractive. Since marginal utilities are higher under the coinsurance arrangement in states where (3.12) binds, the change in τ_{ij}^* is positive in both equations. However, its magnitude may differ across individuals, and the constrained response of transfers to investment is likely to be smaller than the unconstrained response. The outcome also depends

on factors such as wealth (since the difference in marginal utilities becomes smaller as wealth increases), and on whether B increases in response to the shock.[40]

Figure 3.4 illustrates the 'taxation' effect in a simulation of the buffer stock model with a single liquid asset for $n = 2$ and $n = 10$ coinsurance network partners, with x_i along the horizontal axis. The autarky consumption function is included for reference. In this example, there are no constraints on participation; all income is pooled and divided, so the rate of taxation is one half in the two agent ($n = 2$) model. We assume that the incomes of the coinsurance partners are uncorrelated. The effect of coinsurance is to increase consumption for low realizations of x_i, since x_j is expected to be 100 in this zero correlation case. Note that with one counterpart, an individual can on average halve any income shortfall when x is less than μ, but with 10 people

Figure 3.4: Consumption functions for transfer rule (single-asset model)

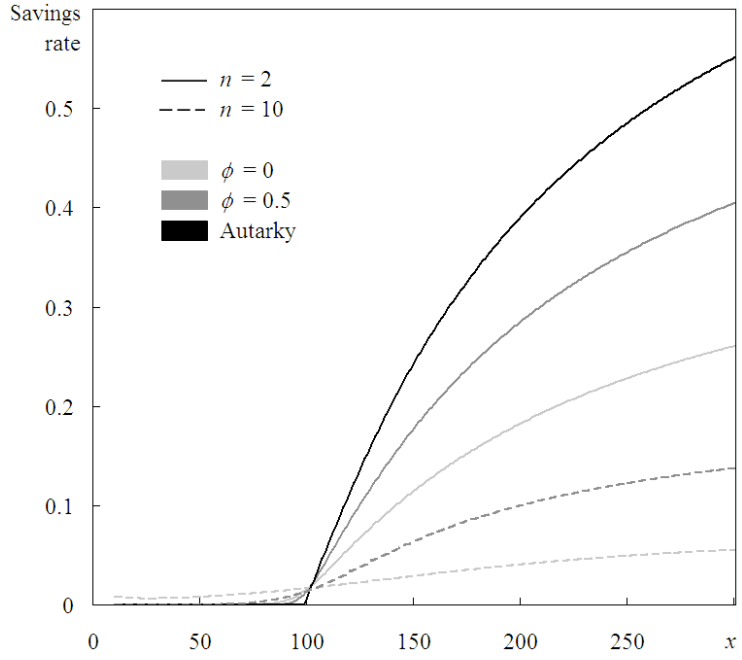


[40] Increases in B that are conditional on such events – such as a community sanction for refusing to share a large and visible windfall, or for consuming goods (such as clothing) above one's 'station' (Platteau, 2009:680, n.24) – can be seen in this framework as an effort on the community's part to alleviate this constraint.

the shortfall is reduced to 10 percent. The cost of this insurance is borne in periods when x is above μ. Figure 3.4 shows that expected consumption is a lot lower for high values of x, and increasingly so as the number of transfer partners increases. This is because the conditional expectation for these other individuals' incomes is much closer to μ, so that average cash on hand for the coinsurance group as a whole is lower than the cash on hand of individual i.

However, savings in the single asset are much lower under coinsurance (dotted lines in Figure 3.5). The investment disincentive effect is increasing in the number of coinsurance partners, n, but decreasing in the correlation of incomes of those partners, ϕ. As the number of partners increases, or the correlation of incomes within the coinsurance network decreases, individuals have less incentive to save. This is partly because they are more able to get help from their transfer partners in bad times, but also because they must share the gains of their investments with these people. As x becomes large, the ratio of savings to its autarky level converges to 0.25 when $\phi = 0.5$ and only 0.1 when $\phi = 0$. Thus coinsurance works like a

Figure 3.5: Savings rates under transfer rule (single-asset model)



progressive intertemporal tax: individuals who save their disposable income, rather than consuming it, pay a tax on the savings (in expectation) in the next period since part of those savings will need to be shared with their friends. This has consequences for the ability of such individuals to invest in income-generating opportunities while remaining embedded in the village social network. It may help explain Platteau's (2009) reference to migration or disconnection from extended family as often the only strategies available to upwardly mobile individuals in such environments.

3.2.3 Hypotheses

We have shown above how in a two-asset framework, individuals who are richer in terms of illiquid assets, *A*, may face a greater marginal transfer burden in response to a positive shock to liquid assets, *x*. We want to know whether the individual will invest part of this shock in *A*, and how this decision might depend on characteristics of the coinsurance group. We have established that the individual's incentive to invest depends on how *A* and *x* are related – specifically, whether increasing *A* increases the individual's marginal utility of consumption (in which case *A* is a complement), decreases it (in which case *A* is a substitute) or leaves it unchanged. If we define the investment response to a shock to liquid wealth as follows:

$$\frac{dA_i}{dx_i} = g(x_i, x_i - \bar{x}_i, n_i)$$

where $\bar{x}_i$ is the mean liquid assets of *i*'s coinsurance network and n_i is the number of members in the network, then we are interested in the signs of the first derivatives of *g*.

This naturally leads to several empirically testable hypotheses. First, investing is only a dominant strategy if agents can raise their utility by doing so. From (3.8), this will be the case if *x* lies above some threshold, thus we expect to find $g_1 > 0$ above this threshold and $g_1 = 0$

below it.

Second, if investing in A does not change x or otherwise increase the marginal utility of consumption, relative wealth and social network size do not affect the optimal investment decision. In this case, $g_2 = g_3 = 0$.

Third, if A is a complement, relatively richer individuals face a disincentive to invest and we expect to find that $g_2 < 0$. On the other hand, if A is a substitute, relatively poorer individuals face a disincentive to invest, so $g_2 > 0$. Both results are strengthened as the size of the coinsurance network increases, so that $g_{23} < 0$ (> 0) for relatively richer (poorer) individuals.

Finally, we consider the possibility that individuals are driven to store their assets in forms that cannot be expropriated by others in the coinsurance network. Since illiquid assets, A, can only be liquidated at a cost in our model, these assets are exempt from the redistribution rule in (3.10) and are less likely to be claimed by others. Having a greater number of coinsurance partners increases the incentive to hide assets in this way, so we expect that $g_3 > 0$.

The model also generates predictions about the response of consumption to shocks to x and A. If individuals are credit constrained, we expect to find a discontinuity in the marginal propensity to consume where $x = \mu$. The marginal propensity to consume is also decreasing in x and in the size of the coinsurance network, n. The above model generates ambiguous predictions for the relationship between the marginal propensity to consume and A, the sign of which depends on whether A is a complement, substitute or neither.

3.3 Data

3.3.1 Sample

The field experiments were conducted between March and October 2009 in conjunction with a year-long household survey in four communities in Akwapim South district of Ghana's Eastern Region. This district lies some 40 miles north of the nation's capital, Accra, but is sufficiently far away that only a handful of respondents commute to Accra for work. The survey was part of a three-wave panel, the first two waves having been conducted in 1997-98 (Udry and Goldstein, 1999) and 2004 (Vanderpuye-Orgle, 2008). The original 1997-98 study was concerned with the welfare of farmers in Ghana's export pineapple industry, and the four communities were randomly selected from Akwapim South because of the scale of the district's contribution to Ghana's pineapple production.

The sample consists of approximately 70 households from each of the four communities. Slightly more than half of these 70 households were part of the initial 1997-98 sample, and the rest were recruited in January 2009 using stratified random sampling.[41] In the original sample, and in the 2009 re-sampling, we selected only from the pool of households headed by a resident married couple.[42] However, we retained households from the 1997-98 sample even if only one of the spouses remained. These 'single-headed households' account for between 7 and 12 of the households in each community (see Appendix Table 2). Thus the sample of individuals included in the experiment was around 150 individuals in each of the four communities (Table 3.1).

[41] New sample members were selected randomly from the subset of households in the community headed by a married couple. The sample was stratified by age of the head into three categories: 18-29, 30-64 and 65+, so that the shares of households whose head was in each of these age categories corresponded to the community's population shares. See the Appendix for further details.

[42] Some men in the sample have two or three wives, all of whom were included.

Table 3.1: Sample size by community and respondent type

	Community				
	Darmang	**Pokrom**	**Oboadaka**	**Konkonuru**	**Total**
Husbands	70	68	69	69	276
Wives	77	69	73	70	289
Single males	4	3	1	3	11
Single females	7	7	6	9	29
Total	158	147	149	151	605

3.3.2 Household and social networks survey

Each respondent was interviewed five times during 2009, once every two months between February and November.[43] Each survey round took approximately 3 weeks to complete, with the two survey teams each alternating between two villages. The survey covered a wide range of subjects including personal income, farming and non-farm business activities, gifts, transfers and loans, and household consumption expenditures. Each round, both the husband and wife heading each household were interviewed separately on all of these topics. The expenditure module obtained detailed information on the quantities and values purchased of a long list of items. Referring to the week prior to the interview, we asked each spouse about his or her own expenditures, those of their partner, and about expenditures of the household as a whole. In the gifts and transfers module, we asked respondents to report any gifts (in cash or in kind) given and received during the past two months, obtaining information on the counterparty's location and relationship to the respondent, and the nature and value of the gift.

In addition, we conducted a detailed survey of respondents' in-sample social networks. The social network survey was conducted in the first round. Each respondent was asked in turn about every other respondent in the sample from his or her community. We asked whether they knew

[43] See the Appendix for an interview schedule, instruments and further details on the survey.

the person, by name or personally, how often they saw them, whether they were related, what they perceived the strength of the friendship to be, whether they had given or received anything of value from the person, and whether they would trust the person to look after a valuable item for them.

3.4 Experimental design

The first round of the survey was designed as a baseline, therefore no lottery took place in that round. One week before each subsequent round we visited each village to distribute prizes to selected respondents. There were twenty prizes allocated in each community, in each of the four lottery rounds, so that in all 320 prizes were given. Over the four lotteries, approximately 42 percent of individuals and 62 percent of households won at least one prize. Ten of the prizes were allocated publicly by lottery, and the other ten (identical in type) were allocated in private, by lucky dip. The values of the prizes varied, as described in Table 3.2. By varying the value of the prizes, we can test whether behavior differs depending on the size of the exogenous asset shock, as might be the case if for instance there were threshold effects for transfers to family members. The prizes were of a substantial size. During 2009, mean monthly per capita expenditure was around GH¢65.[44]

The livestock prizes were purchased by the survey team in Accra on the morning of the lottery, and transported to the community. The chickens were of a type intended for eating, and were chosen because their price was essentially fixed at GH¢10 throughout the year. The goats were bought individually at the large Tema market by direct negotiation with the traders. On our first visit we established roughly the size and quality of goats available for the three price

[44] One Ghana cedi (GH¢) was worth about 70 US cents in mid 2009.

Table 3.2: List of prizes distributed in each lottery and lucky dip

Cash	Livestock
GH¢10	One broiler chicken, worth GH¢10
GH¢20	Two broiler chickens, worth GH¢10 each
GH¢35	Small goat, worth GH¢35
GH¢50	Medium goat, worth GH¢50
GH¢70	Large goat, worth GH¢70

Notes: On average during 2009, one Ghana cedi (GH¢) was worth approximately 70 US cents. Mean per capita consumption averaged around GH¢65 per month in the study communities.

points (GH¢35, GH¢50 and GH¢70), and on every subsequent visit endeavored to obtain goats of similar size and quality, subject to market price and supply fluctuations.[45] We selected female goats where possible because of their utility for breeding.

The lotteries and lucky dips took place one week before the commencement of the survey interviews. We took great care to make clear to participants that the allocation of prizes was random, and that each individual had an equal chance of winning in each round. A village meeting was held in the community, and all respondents were invited to attend. A small amount of free food and drink was provided as an incentive to come. Attendance at the meetings was generally around 100 people; roughly half of the respondents appeared for each meeting.[46] There were usually a number of non-respondents at these meetings as well, including many children. At each gathering we thanked the participants for their continued support. We explained that respondents had a chance to win one of 20 prizes that day, framing the prizes as a gratuity for

[45] There was little price movement in the goat market throughout the year, though the price of chickens slowly appreciated, rising perhaps 20 percent over 2009. We absorbed the additional cost of chickens to maintain quality. The quality of goats varied slightly between rounds in line with supply and climatic conditions, but we made a concerted effort to keep the quality (size and type) comparable across rounds.

[46] Around 125 of the 150 respondents in each community appeared for the private lucky dip, some of them arriving before or after the public meeting.

their participation in the survey.[47,48] We then proceeded to draw winners for the ten public prizes (without replacement) from a bucket containing the names of the survey respondents. A village member not in the sample was chosen by the villagers to do the draw, in order to emphasize that the outcomes were random. Each winner was announced to the group, and asked to come forward to receive their prize. The prizes were announced and displayed clearly before being awarded. Respondents who were absent at the time of drawing were called to pick up their prize in person, if possible. We also allowed spouses or close family members to receive the public livestock prizes (but *not* cash prizes) on the winner's behalf. Unclaimed prizes were delivered in person to the winner after the lottery.[49]

After the lottery prizes were distributed, we conducted the lucky dip. Respondents were asked to identify themselves to a survey worker, who took their thumbprint or signature and issued them with a ticket displaying their name and identification number. They then waited to enter a closed school room, one at a time, where an enumerator invited them to draw a bottle cap without replacement from a bag. Care was taken to shuffle the bottle caps after each draw, and to prevent respondents from seeing into the bag. If a respondent drew more than one bottle cap, those caps were shuffled and the respondent was asked to blindly select one of them. There was one bottle cap for each of the n respondents in the community. Of these, $n - 10$ were non-winning tokens (red colored), and ten were winning tokens, marked distinctively to indicate one of the ten prizes listed in Table 2.[50] Those who drew winning tokens were informed immediately that they had won a prize, which was identified to them, and were told that they did not have to

[47] Respondents signed an informed consent form at the start of the survey, explaining how they would be remunerated for their participation in the survey. Entry in the lottery and lucky dip was part of this remuneration.
[48] In addition to the chance of winning a prize, each respondent was given a small amount of cash for their participation, which varied across rounds. This gift was used as an endowment in the public goods experiment, described in detail in Chapter 2 of this dissertation.
[49] We have data on these cases, including the dates on which the prizes were claimed and the identity of the recipient (if not the winner).
[50] Respondents were shown a sheet relating the tokens to the prizes; a copy is included in the Appendix.

tell anyone else that they had won. We emphasized that the survey team would not divulge the identities of the lucky dip prize winners. Cash prizes were given to the winners immediately. Livestock prizes were delivered one or two days later to the winner in person, or to another household member if they were absent.[51,52] At the conclusion of the day, tokens that had not been drawn were counted and the remaining prizes allocated randomly among the non-attending respondents using a computer. There were usually 25-30 non-attendees and less than three prizes remaining.

All of the winners collected or received their prizes within one month of the lottery, and in all but one case at least a week before the household survey interview. The interviews commenced one week after the lottery, deliberately delayed to allow winners to receive their prize and do something with it. The interviews took place in no specified order throughout the following three weeks, so that some winners were interviewed a week after receiving their prize, and others up to four weeks afterwards.

Table 3.3 provides summary statistics on key variables for treated and untreated individuals, verifying that the treatment was random. The only statistically significant difference ex ante between the treatment groups is for gifts received; this seems to be driven by an outlier, since the standard error also increases dramatically.

[51] If anyone received the prize on behalf of the winner, we made it clear who the animal was intended for. In our follow-up survey, we interviewed each winner about their prize, and established that all of them ultimately received their prizes.

[52] Clearly, there was no way of keeping the livestock prizes completely secret. It should be assumed that members of the winner's household were all aware of those prizes. However, we tried to keep the delivery of the lucky dip livestock prizes as low-profile as possible. Thus there is a distinct difference in publicity between the lottery and lucky dip prizes, at least with respect to non-household members.

Table 3.3: Balance of treatment by key round 1 variables

Variable	Non-winners	Public prize	Private prize
Demographic characteristics			
Male	0.484	0.448	0.475
	(0.500)	(0.499)	(0.501)
Years schooling	7.259	7.731	7.240
	(3.977)	(4.002)	(4.266)
Num. adults	3.141	3.122	3.271
	(1.594)	(1.564)	(1.835)
Num. kids	1.882	1.748	1.812
	(1.438)	(1.361)	(1.372)
Age of HH head	45.254	45.336	46.624
	(13.416)	(14.433)	(14.16)
Holds office	0.087	0.054	0.117
	(0.282)	(0.227)	(0.322)
SN size	91.35	92.233	91.194
	(39.947)	(40.075)	(38.409)
Friends given gift	31.367	30.552	32.201
	(28.837)	(28.846)	(30.575)
Coinsured	0.510	0.433*	0.475
	(0.501)	(0.497)	(0.501)
Coinsured (HH)	0.691	0.679	0.712
	(0.463)	(0.469)	(0.454)
Relatively rich^	0.427	0.425	0.468
	(0.495)	(0.496)	(0.501)
Relatively rich^ (household)	0.527	0.493	0.532
	(0.5)	(0.502)	(0.501)
Relatively rich^ (alt. measure)	0.854	0.873	0.914
	(0.694)	(0.73)	(0.717)
Rel. rich HH^ (alt. measure)	0.986	0.985	0.993
	(0.688)	(0.715)	(0.717)

Variable	Non-winners	Public prize	Private prize	Non-winners	Public prize	Private prize
	Ex-ante variables (round 1)			**Ex-post variables (rounds 2-5)**		
Total expenditure	627.383	581.35	674.495	466.776	493.796	490.208
	(504.752)	(370.986)	(622.185)	(299.674)	(339.05)	(296.547)
Food expenditure	327.468	319.637	352.763	269.305	275.505	281.168
	(209.303)	(174.126)	(246.492)	(135.914)	(154.165)	(135.977)
Other expenditure	136.671	128.144	131.296	103.699	107.832	117.552**
	(105.962)	(96.204)	(106.083)	(83.369)	(88.317)	(83.839)
Asset expenditure	14.442	26.062	28.344	5.643	5.481	4.114
	(89.491)	(147.932)	(153.018)	(24.508)	(21.229)	(14.501)
Abnormal exp.	148.802	107.506*	162.092	88.13	104.978	87.375
	(338.216)	(182.476)	(441.616)	(187.31)	(201.062)	(171.277)
Farm expenses^^	17.906	15.917	19.176	17.387	33.648***	28.477**
	(52.361)	(56.338)	(67.05)	(54.177)	(122.119)	(123.197)
Log liquid assets	5.331	5.482	5.451	4.735	4.795	4.943*
	(1.48)	(1.41)	(1.462)	(1.566)	(1.51)	(1.636)
Log illiquid assets	6.610	6.640	6.618	6.749	6.770	6.803
	(0.986)	(0.904)	(1.047)	(0.778)	(0.675)	(0.816)
Gave transfer	0.507	0.560	0.46	0.381	0.44*	0.5***
	(0.501)	(0.498)	(0.5)	(0.486)	(0.498)	(0.502)
Amount given	16.438	14.451	28.027	9.336	7.898	10.63
	(36.648)	(24.224)	(131.189)	(23.798)	(16.676)	(28.373)
Received transfer	0.519	0.590*	0.532	0.462	0.520*	0.506
	(0.500)	(0.494)	(0.501)	(0.499)	(0.501)	(0.502)
Amount received	25.995	30.194	48.281***	23.082	19.360	28.966
	(42.709)	(46.301)	(123.214)	(52.548)	(28.139)	(60.313)
Gave transfer (within village)	0.350	0.328	0.302	0.271	0.327*	0.353**
	(0.478)	(0.471)	(0.461)	(0.445)	(0.471)	(0.479)
Amount given (within village)	9.382	5.175*	7.155	4.468	3.236	3.953
	(30.744)	(11.799)	(31.032)	(17.303)	(7.285)	(9.181)
Received transfer (within village)	0.246	0.306*	0.245	0.212	0.227	0.231
	(0.432)	(0.463)	(0.431)	(0.408)	(0.42)	(0.423)
Amount received (within village)	5.204	9.196**	24.132***	4.368	4.312	4.859
	(15.79)	(25.436)	(112.399)	(16.219)	(13.789)	(13.777)

Means and standard deviations (in parentheses) by individual. Treatment status is never won, or won at least one prize of type. *** denotes means different at 1%, ** at 5%, * at 10%. ^ Defined in Section 3.6.5. ^^ Farm expenses are total expenses over the preceding month on non-asset items and services related to farming, captured in Parts F and G of the Plot Questionnaire, on pages 10 and 11 of the Household Survey Questionnaire (see Appendix).

3.5 An overview of the results of the experiment

At the end of each survey round, one month after the lottery, we administered an additional, short follow-up survey just to prize winners. The follow-up survey asked for confirmation about the type of prize the respondent won, and the date on which it was received. If the prize was not received by the respondent on the day of the lottery, we noted who had collected it and when the respondent had received it from them. We then asked for a detailed description of what the respondent had done with the prize. The results of the follow-up survey should be interpreted conservatively, because in addition to the potential for reports to be inaccurate or deliberately misleading, the impact of winning a prize may influence other aspects of the household's behavior or expenditure (such as effort and time allocation). Individuals may also report only direct results of their prize-winning, such as increased gifts to others, but ignore indirect outcomes, such as reduced transfers received from others.

3.5.1 Cash prizes

For each winner of a cash prize, we obtained a detailed breakdown of what was done with the prize money. Respondents were asked to list items, including assets, purchased with the winnings, and any amounts invested, saved, given away or lent to others. The results are summarized in Table 3.4a. One month after the lottery, cash prize winners had spent on average between 65 and 80 percent of their prize, with the percentage declining as the value of the prize increased. For the smaller prizes, the majority of this expenditure was on consumption goods, whereas for larger prizes more was spent on investment goods or business expenses. The most common purchase was farm inputs such as chemicals or seeds, followed by stock for sale (e.g., at a stall) and then farm services (such as weeding or water fetching). A very small share of the

Table 3.4a: How cash prizes were spent (from follow-up survey)

	Mean (GH¢)					Share of total (%)				
Prize value (GH¢)	**10**	**20**	**35**	**50**	**70**	**10**	**20**	**35**	**50**	**70**
Spent	6.22	10.64	16.15	23.53	27.91	62.19	53.20	46.14	47.06	39.87
Consumption goods	5.59	4.58	6.03	5.72	11.83	55.94	22.89	17.23	11.44	16.90
Investment goods	0.31	3.13	8.33	12.19	5.30	3.13	15.63	23.81	24.38	7.57
Bills*	0.31	2.03	1.39	2.97	7.03	3.13	10.16	3.98	5.94	10.04
Livestock	--	--	--	1.09	--	--	--	--	2.19	--
Funeral expenses	--	--	--	--	2.81	--	--	--	--	4.02
Other	--	0.91	0.39	1.56	0.94	--	4.53	1.11	3.13	1.34
Saved	0.31	1.59	3.48	8.75	10.56	3.13	7.97	9.96	17.50	15.09
Invested in business or farm**	1.97	4.89	9.70	15.31	15.94	19.69	24.45	27.71	30.63	22.77
Gave away	0.88	2.25	3.35	1.16	9.81	8.75	11.25	9.57	2.31	14.02
Other	0.63	0.63	2.32	1.25	5.78	6.25	3.13	6.62	2.50	8.26
Lent to others	--	--	0.61	--	--	--	--	1.73	--	--
Repaid debt***	0.31	--	1.06	0.94	--	3.13	--	3.03	1.88	--
Other	0.31	0.63	0.65	0.31	5.78	3.13	3.13	1.86	0.63	8.26

* Such as electricity bills, school fees outstanding, hospital costs.
** Expenses for business or farming, such as land, laborers and stocks for sale.
*** Outstanding loan debt to individuals or organizations, excluding those listed under 'bills'.

Table 3.4b: How livestock prizes were spent (from follow-up survey)

	Mean (GH¢)					Share of total (%)				
Prize value (GH¢)	**10**	**20**	**35**	**50**	**70**	**10**	**20**	**35**	**50**	**70**
Kept	0.94	5.00	20.78	26.56	32.81	9.38	25.00	59.38	53.13	46.88
Sold	0.31	2.50	10.39	9.68	30.63	3.13	12.50	29.69	19.35	43.75
Ate	8.75	11.25	0.55	--	4.38	87.50	56.25	1.56	--	6.25
of which shared	0.70	1.23	0.10	--	1.04	7.03	6.14	0.28	--	1.48
Gave away	--	0.94	1.09	--	2.19	--	4.69	3.13	--	3.13
Lost/stolen/died	--	0.94	2.19	7.81	--	--	4.69	6.25	15.63	--
Other	--	0.31	--	--	--	--	1.56	--	--	--
Use of funds (those who sold)										
Amount obtained for animal(s)	4.00	10.00	28.80	41.43	52.29	100	100	100	100	100
Spent	4.00	7.60	13.60	20.23	24.46	100	76.00	47.22	48.83	46.79
Consumption goods	4.00	5.60	2.50	9.66	7.00	100	56.00	8.68	23.31	13.39
Investment goods	--	2.00	6.80	8.43	6.61	--	20.00	23.61	20.34	12.64
Bills*	--	--	3.30	2.14	11.39	--	--	11.46	5.17	21.79
Livestock	--	--	--	--	--	--	--	--	--	--
Funeral expenses	--	--	1.00	--	--	--	--	3.47	--	--
Saved	--	2.00	5.70	12.14	9.29	--	20.00	19.79	29.31	17.76
Invested in business or farm**	--	--	--	4.77	13.21	--	--	--	11.52	25.27
Gave away	--	--	2.00	--	5.00	--	--	6.94	--	9.56
Other	--	--	7.50	4.29	0.32	--	--	26.04	10.34	0.61
Not yet received^	--	--	7.00	--	--	--	--	24.31	--	--
Other	--	--	0.50	4.29	0.32	--	--	1.74	10.34	0.61

^ Some had not yet received payment for the sale of their animal.
* Such as electricity bills, school fees outstanding, hospital costs. ** Expenses for business or farming, such as land, laborers and stocks for sale.

prize was reported as having been saved, especially for the smaller prizes, which might suggest that households face credit constraints and have clear and immediate needs for the money.[53] Furthermore, the average amount given away to others did not exceed 15 percent of the prize value, across all categories. This suggests that the redistribution of cash transfers may not be substantial, and that claims from others are not a significant factor in determining how cash transfers might be spent. Below we discuss how often such claims were made, and how often they were honored.

3.5.2 Livestock prizes

Respondents who won livestock prizes were asked whether they had kept, eaten, sold, given away or lost their animal. We obtained details on the dates of these actions and the value of the parts of the animal to which the action applied. For animals (or animal parts) which were sold or given away we asked for the identity of the person(s) who received them, and how much money was received for the animal if it was sold. If the respondent still had the animal, we asked what they intended to do with it. A summary of the results for livestock prizes is presented in Table 3.4b. The treatment of animal prizes depended strongly on the type of animal won. Although we tried to standardize the gifts, there is a clear distinction between the results for chickens (GH¢10 and GH¢20) and for goats (GH¢35, GH¢50 and GH¢70). Respondents treated the chickens essentially as a food prize; such animals are not kept for breeding, but rather eaten on special occasions. In contrast, the goats can be bred quite profitably and were more often kept than eaten. Table 3.5 reports the intended uses of the kept animals, confirming how differently chickens and goats were treated.

[53] It might also imply that individuals lack self-control with respect to saving, as has been documented widely in the behavioral economics literature (since at least Thaler and Shefrin, 1981). Another explanation is that by spending their prize quickly, they could shield the money from the claims of others.

Table 3.5: Intended uses of animals kept (at time of follow-up survey)

Prize value (GH¢)	Prize Type	Plan for use			
		Eat	Breed	Sell	Give away
10	Chicken	3	0	0	0
20	Chicken	7	0	1	1
35	Goat	1	15	1	0
50	Goat	1	16	0	0
70	Goat	0	13	3	0

Of those winners who kept their chickens, most were saving them to eat later. The vast majority who won one chicken ate it within the month, while winners of two chickens were more likely to keep or sell at least one of them. People who won goats, meanwhile, were substantially more likely to keep them. Respondents who kept their goat overwhelmingly intended to use it for breeding. Around 20 percent of livestock recipients sold their animal(s). Particularly for the goats, it is apparent that they did not obtain the full market price for their animal. This may have been due to a lack of market depth or an appearance of distressed selling. Some individuals sold to family members, thus the markdown may have been essentially a gift. Interestingly, the money the sellers received for their animals was spent in roughly the same pattern as the money of cash prize winners. This contradicts the mental accounting hypothesis, which states that money is treated differently depending on how it was obtained. For those who ate their animal, we recorded whether non-household members shared the meal. On average, this and the proportion of animals given away were very small.

3.5.3 Requests

As discussed in the introduction, social norms in many societies oblige individuals to share windfalls with others. Given that the prizes we allocated were clearly won by luck alone, one

might expect from the above discussion that requests from others would be especially prevalent. We asked respondents in the follow-up survey whether anyone had requested something from them as a result of them having won. This was not limited to sharing the prize – any request coming from others "because you won a prize" was to be noted. Respondents were asked to identify any requesters, the item (or amount of money) requested, and whether the request was granted. First, the rate of requests was very low. Less than 10 percent of cash prize winners overall received requests, and this proportion did not increase with the size of the prize. Even more surprisingly, only 45 percent of these requests were honored. The lack of requests was not due to non-winners expecting to win later, since the rate of requests was actually highest in the first round of the lottery, and fell in later rounds. Nor was this due to saturation, since 58 percent of individuals and 39 percent of households *never* won a prize in any of the four lotteries.

Tables 3.4a and 3.4b illustrate how uncommon sharing of the prizes was (at least, in direct terms). Less than 15 percent of cash prizes and less than 10 percent of animal prizes was shared. Neither was the sharing done implicitly through loans; lending of prize money was almost non-existent. This is a perplexing result in light of the emphasis placed on sharing norms in sub-Saharan Africa (of which Ghana is no exception). Below we consider the econometric evidence on this point, in case there is underreporting or some evasion in responses to the direct questioning of the follow-up survey. However, our econometric evidence is no more indicative of broad sharing behavior. The result is actually consistent with recent evidence from Fafchamps et al. (2010), who find low rates of sharing of cash grants among small-business owners in urban areas of Ghana.[54] It is also consistent with econometric evidence from observational data on Ethiopian pastoralists (Lybbert et al., 2004) and Kenyan pastoralists (McPeak, 2006).

[54] Although they describe recipients as spending their grants on consumption or transfers, their results suggest the degree of sharing is similarly small; men do not transfer significantly in response to receiving a grant, while women gave away on average only GH¢8 of their GH¢150 grant. (See Table 4, p. 30 of Fafchamps et al., 2010).

3.6 Econometric analysis

3.6.1 Variables

We now turn to econometric analysis of the household survey data collected in the month following the lottery. The lottery prizes were unanticipated shocks to cash-on-hand (or S_t in the notation of Section 3.2) in the case of cash prizes, and to the stock of illiquid assets (or A_t in Section 3.2's notation) in the case of animal prizes. Given their randomness, we are able to directly estimate the effect of these shocks on recipients' consumption, investment and transfers and test the hypotheses outlined in Section 3.2.3.

We first describe the construction of the independent variables to be used in the estimation. An integral part of the econometric model is estimating the effect on behavior of an individual's involvement in the village social network. The social networks module provides a wealth of data on respondents' friendships with every other survey respondent in their village.[55] These data come from the first round of the household survey, before the lotteries began, and therefore refer to the individual's history of interactions before our arrival in the villages and, most importantly, before the lotteries experiment began.

We define the size of an individual's coinsurance network (or n_i, from Section 3.2) by the number of sample individuals to whom the respondent reported having ever given a gift prior to the social networks survey.[56] By doing so, we count only close friends who are more likely to be

[55] While the survey did not cover the entire village network, the survey sample was randomly selected and therefore the data are a random sample of nodes in that network. Describing the sampled network is thus tantamount to randomly partitioning the village into two smaller sub-villages and describing the relationships at the sub-village level. Summary statistics on the sampled network are asymptotically equivalent to those of the village network as a whole. Nevertheless, we collected data on transfers between respondents and all other individuals, both village members and those outside the village.

[56] The number of friends from whom the individual reported receiving a gift was almost identical to the number given a gift; the correlation is not statistically significantly different from one ($p = 0.44$).

coinsurance partners.[57] Thus defined, the size of coinsurance networks varies widely; some individuals exchanged gifts with almost everyone in the village sample, and others reported no gift exchanges (Table 3.3). In order to distinguish those individuals with larger coinsurance networks, we split the sample into two equal-sized groups based on this variable, defining a dummy variable $\theta = 1$ for those individuals with a value above the median for their village, and $\theta = 0$ otherwise.[58] We choose to discretize this measure, rather than using levels, since the distributions of social network sizes vary substantially across communities and are highly non-normal. At the household level, we define an analogous dummy variable that takes the value one if any spouse is coinsured. Having fewer friends with whom one has exchanged gifts is an indicator of a smaller coinsurance network, and therefore less sharing obligations ceteris paribus.[59]

An essential component of the model presented in Section 3.2 is the value of liquid assets, *x*. This is the sum of self-reported Ghana cedi values of local and foreign currency, bank account balances, stores of food and farm output, and net receivables. It would be desirable to have a measure of liquid assets from just prior to the lottery, but our report comes from the survey data collected in the month following the lottery. Therefore, we use liquid assets from the previous round (about 3-6 weeks prior to the lottery), which we have for all lottery rounds because the lotteries started only in round 2.

We define illiquid assets as the self-reported sum of equipment, durable goods, livestock,

[57] For example, Table 3.3 shows that respondents, on average, knew 95 of the roughly 150 other respondents in each village, but reported having given gifts to only 31 of these, on average.
[58] The medians were 25 in Darmang, 19 in Pokrom, 20 in Oboadaka and 39 in Konkonuru.
[59] We also tried alternative definitions of coinsurance, such as the number of friends reporting having given the respondent a gift, the number of friends from whom the individual reported receiving a gift, and the number of friends reported as trusted. The results do not differ substantially under these alternative definitions. We favor the above definition as most closely capturing the extent of the individual's gift obligations to other sample members.

jewelry, cloth and stocks for sale.[60] We exclude land from our measure, because land values could not be computed for specific plots due to the shallow market for land in the survey area.

The data on gifts and receipts come from a specialized module which asked respondents to report all gifts and receipts in the preceding month. Enumerators probed for all gifts, no matter how small, including in-kind transfers like meals. The vast majority of reported gifts are for very small amounts (less than GH¢10), suggesting the enumerators were successful in this respect. We generate a separate measure of gifts and receipts exchanged between village members, based on the reported location of the counterparty. This does not guarantee the counterparty was in our sample, however.

Consumption is reported by individual, broken down into self expenses and reported expenses of other household members. It is defined as the total value of household non-business purchases during the previous month, plus the value of consumption from family farms, livestock and stores, and other expenses (such as school fees, health care and ceremonial contributions), but excluding rent. Our measure includes durable asset purchases, though we also present results for consumption excluding asset purchases. Since the consumption questionnaire was given to both husbands and wives, we take the maximum of the sum of the self-reports of individual expenses and the maximum reported total for the household. In practice these differed by only a small amount, but this approach was necessary because some husbands did not participate in purchases, or refused to answer the section, based on a cultural attitude in Ghana that purchasing food is 'women's business'.

In the analysis below, we exclude 31 individuals (9 households) from the analysis because they were either outliers in terms of assets, or lacked social network survey data.

[60] We explored using factor analysis to generate an asset index, as in Sahn and Stifel (2003), however there was insufficient correlation between these items, and other indicators such as land area and building characteristics, to generate a single explanatory factor.

3.6.2 Consumption

We estimate the effect of prize-winning on consumption using a household fixed effects estimator. As discussed in Section 3.2.3, the marginal propensity to consume out of liquid assets depends on the presence of credit constraints and the size of the coinsurance network. The marginal propensity to consume out of illiquid asset windfalls depends on whether the latter are complements or substitutes to consumption, or neither. We are also interested in testing whether the publicity of the prize affects the consumption response. Specifically, we test the hypothesis that public winnings are consumed faster (less likely to be saved) than private winnings, if being known to have liquid assets increases the chance of being asked for assistance by others.

We first regress log per capita household consumption on prizes – separated into public/private and cash/livestock groups – and household (ν_i) and round (ξ_t) fixed effects:

$$\ln pcx_{it} = \alpha + \beta_1 cash_{it}^{pub} + \beta_2 cash_{it}^{pri} + \beta_3 live_{it}^{pub} + \beta_4 live_{it}^{pri} + \nu_i + \xi_t + \varepsilon_{it}. \quad (3.13)$$

where pcx_{it} is per capita consumption of household i in round t, $cash_{it}$ is the value of cash prizes won by the household i in round t, $live_{it}$ is the value of livestock prizes won by the household i in round t, with the superscripts *pub* and *pri* distinguishing between public and privately won prizes. The $N(0, \sigma^2)$ iid error term, ε_{it}, is orthogonal to these independent variables by the experimental design.

Estimates of Equation 3.13 are reported for both total and food expenditure in the first two columns of Table 3.6. In columns 3 and 4, we present results including one-period lags of the prizes (restricting the sample to rounds 3 to 5). With median per capita consumption around GH₵114 during the year, the coefficient estimates imply that about 40 percent of prize money,

Table 3.6: Response of consumption to prize winning

Sample							**Coinsured**	**Not coinsured**
Dep. variable	Total	Food	Total	Food	Total	Food	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Contemporaneous prizes (GH¢)								
Cash - public	0.0029**	0.0020*	0.0032***	0.0023**	0.0034***	0.0025**	0.0053***	0.0008
	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0015)	(0.0023)
Cash - private	0.0028**	0.0022**	0.0031**	0.0026**	0.0031**	0.0026**	0.0038***	0.0008
	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0013)	(0.0027)
Livestock - public	0.0001	0.0000	-0.0006	-0.0006	-0.0007	-0.0007	-0.0004	-0.0014
	(0.0011)	(0.0010)	(0.0012)	(0.0010)	(0.0012)	(0.0010)	(0.0015)	(0.0020)
Livestock - private	-0.0002	0.0007	0.0002	0.0010	0.0003	0.0010	0.0024	-0.0030
	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0015)	(0.0020)
Lagged prizes (GH¢)								
Cash - public			0.0018	0.0014	0.0020	0.0015	0.0037**	-0.0015
			(0.0014)	(0.0012)	(0.0014)	(0.0012)	(0.0017)	(0.0025)
Cash - private			0.0024*	0.0029**	0.0025*	0.0028**	0.0027*	0.0013
			(0.0014)	(0.0013)	(0.0014)	(0.0013)	(0.0016)	(0.0029)
Livestock - public			-0.0032**	-0.0028**	-0.0031**	-0.0027**	-0.0039**	-0.0024
			(0.0014)	(0.0013)	(0.0014)	(0.0013)	(0.0018)	(0.0024)
Livestock - private			0.0016	0.0011	0.0017	0.0010	0.0016	0.0023
			(0.0015)	(0.0013)	(0.0015)	(0.0013)	(0.0018)	(0.0028)
Contemporaneous prizes won by friends^								
Cash - public					0.0004*	0.0004*	0.0006**	0.0000
					(0.0002)	(0.0002)	(0.0002)	(0.0007)
Cash - private					0.0002	0.0000	0.0003	0.0004
					(0.0002)	(0.0002)	(0.0002)	(0.0007)
Livestock - public					-0.0002	-0.0001	-0.0002	0.0001
					(0.0002)	(0.0002)	(0.0002)	(0.0008)
Livestock - private					-0.0002	-0.0003	0.0000	-0.0005
					(0.0002)	(0.0002)	(0.0003)	(0.0008)
Lagged prizes won by friends^								
Cash - public					0.0000	0.0002	0.0000	-0.0001
					(0.0003)	(0.0002)	(0.0003)	(0.0008)
Cash - private					0.0000	0.0000	0.0000	-0.0005
					(0.0003)	(0.0002)	(0.0003)	(0.0009)
Livestock - public					0.0000	0.0001	0.0001	-0.0007
					(0.0003)	(0.0002)	(0.0003)	(0.0009)
Livestock - private					-0.0003	-0.0004	-0.0002	-0.0008
					(0.0003)	(0.0002)	(0.0003)	(0.0009)
Number of obs.	1,481	1,481	1,481	1,481	1,481	1,481	1,007	474
Households	302	302	302	302	302	302	202	100
Adjusted R^2	0.113	0.080	0.121	0.089	0.126	0.946	0.176	0.078

Dependent variable: Household log per capita expenditure during past month.

Robust standard errors in parentheses. *** = p<0.01, ** = p<0.05, * = p<0.1

^ Sum of all prizes (in GH¢) won by other villagers whom members of the household reported having ever given a gift.

on average, was spent on household consumption within a month.[61] Taking into account that food consumption is just over half of total consumption (Table 3.3), just less than one fifth of the prize money on average was spent was on nonfood items, an aggregate luxury good in these villages. Private cash prizes appear to have had an additional effect on consumption in the subsequent two-month period, suggesting some of the prize may have been saved initially.

The results are very different for livestock prizes, which do not increase consumption at all, and actually reduce it in the case of lagged public livestock prizes. At the very least, we should see some effect from the large number of chickens reported eaten in the few weeks after they were won.[62] One possible explanation for this result is that some individuals failed to report the chickens in the consumption module, although we explicitly asked about livestock consumed from own stocks and counted this in the consumption measure. It is also possible that eating the chickens 'crowded out' usual household expenditure, and that this offset the value of the livestock consumed.

One striking result here is how similar were the consumption responses to public and private prizes. Goldberg (2010) argues that if coinsurance obligations are involuntary, driven by demands from others, one might expect to see individuals consume publicly-won prizes faster than privately-won prizes, in order to avoid obligations to share their windfall. In contrast to Goldberg's findings, we are unable to find any difference in consumption behavior resulting from the publicity of prize winning. None of the pairs of public/private coefficients in Table 3.6 are statistically different at conventional significance levels. This indicates that people's consumption decisions were not influenced by fears of being asked to share publicly won prizes.

[61] Since the coefficient estimates are very small, the treatment effect can be roughly approximated by the result that $\ln(1+x) \approx x$. Multiplying the coefficient estimate by mean per capita consumption gives the approximate increase in spending per Ghana cedi won.

[62] Coefficient estimates for chickens and goats specified separately were statistically insignificant and are not reported.

One explanation for this is that sharing is voluntary, rather than coerced, with transfers made in response to some internal motivation (such as status building motives, altruism, or fear of retribution for being discovered to have concealed winnings). Individuals would then make the same transfer whether the prize was public or private, and spend the balance identically. It is also possible that sharing obligations did not apply to these windfalls (though this conflicts with the notion that such obligations exist to smooth income shocks and redistribute wealth). Indeed, in the following section we observe that transfers were negligible in response to all types of prizes. Thus sharing obligations do not appear to have been much of a concern at all in determining how prizes were spent.

In columns 5 and 6 of Table 3.6, we report specifications including total current and lagged prizes won by members of the household's coinsurance network.[63] The estimated effect of friends' prizes (defined as the sum of all prizes won by close friends of the household members) is quite small, and only statistically significant for cash prizes. In part, this can be attributed to the fact that the median network has 24 members, and those in the top decile have over 70. Any sharing that took place was divided, on average, across many of those members.

However, it is instructive to examine the results of the model for coinsured and non-coinsured households separately. As mentioned above, this measure breaks the sample into two equal-sized groups based on the number of close friends of each respondent. These results, in columns 7 and 8 of Table 3.6, show quite strikingly how those with smaller social networks differ in their behavior.[64] Among the non-coinsured group, prize-winning by the household or

[63] As described in Section 3.6.1, each individual's coinsurance network is defined as the set of other respondents in the village whom the individual reported having given gifts at any time prior to round 1. The household measure is the mean of the individual measures for members of that household.

[64] Since we define a coinsured household as one in which any member is coinsured, two-thirds of households fit the definition. The model results are not substantially different if we use the household head's coinsurance status instead.

friends has no significant effect on consumption. Thus, it appears that households with smaller networks do not receive more focused assistance from their friends, but rather self-insure in order to smooth their consumption in line with the predictions of the permanent income hypothesis. This echoes the findings of Vanderpuye-Orgle and Barrett (2009), who studied data from the same sample in 2004, that certain individuals in these villages are essentially excluded from the village coinsurance network. For coinsured households, the patterns are the same as for the aggregate, except with larger estimated consumption effects. The coinsured do not treat transitory income or asset shocks as the permanent income hypothesis would predict. Rather, their behavior is more in line with the predictions of the model we developed earlier.

3.6.3 Consumption smoothing

It appears that only part of the prize money was spent in the month following the lottery, and that the indirect effect of friends' prizes on consumption is at most very small. To what extent does coinsurance (and, among the non-coinsured, buffer stock saving) smooth consumption? Separating income into permanent and transitory components following Paxson (1992) is not really feasible with only four villages. However, we can get some sense of how individuals smooth their consumption by using the panel nature of our data to extract the village–round common component from household log per capita income, and then separate the residual into a 'permanent' household income measure (reflecting other invariant household characteristics) and a 'transitory' component capturing shocks and measurement error. We can then regress log per capita consumption on these three components to measure its responsiveness to the different sources of variation in income. We do this in two stages. First, we regress log per capita income for household i on a village-round fixed effect vector (where k is the village of

household i, and t is the round):

$$\ln y_{it} = \nu_{kt} + \epsilon_{it}. \tag{3.14}$$

The fitted values of Equation 3.14 are the village common components of consumption as they evolved over 2009. We then take the residuals from this regression and regress them on household fixed effects:

$$\hat{\epsilon}_{it} = \gamma_i + \eta_{it}$$

The fitted values $\hat{\gamma}_i$ from this regression are the household permanent income components, while the predicted residuals $\hat{\eta}_{it}$ are the transitory income components (along with measurement error). We then regress log household per capita consumption on a constant and the three components of income, adding interactions of each with the indicator variable, θ_i, of whether the household is locally coinsured:

$$\begin{aligned}\ln pcx_{it} = {} & \delta_0 + \delta_1\theta_i + \delta_2\hat{\nu}_{kt} + \delta_3\theta_i\hat{\nu}_{kt} + \delta_4\hat{\gamma}_i + \delta_5\theta_i\hat{\gamma}_i \\ & + \delta_6\hat{\eta}_{it} + \delta_7\theta_i\hat{\eta}_{it} + \vartheta_{it}.\end{aligned} \tag{3.15}$$

The coefficient estimates from (3.15) capture the responsiveness of consumption to common, permanent and transitory income shocks. This procedure is a rough-and-ready check of households' consumption smoothing abilities, since consumption smoothing of transitory shocks will be overstated by any measurement error in income. However, we expect that this measurement error should be identically distributed for coinsured and non-coinsured households, and constant over time and across villages, so the relative comparison of consumption smoothing behavior remains valid.

Perfect coinsurance at the village level would imply that $\delta_6 = \delta_7 = 0$. We expect coinsured households to be more capable of smoothing transitory income shocks than non-coinsured households, thus we test the null hypothesis that $\delta_7 \leq 0$ against the alternative

hypothesis that $\delta_7 > 0$. Coinsured households, which derive greater insurance from other households in the village, are likely to be equally (or more) exposed to village-level common shocks. Accordingly, we anticipate being unable to reject the null hypothesis that $\delta_3 \leq 0$ in favor of the alternative that $\delta_3 > 0$.

The results of this exercise are presented, for all households and separately by coinsurance level, in Table 3.7. Results using total, non-asset and food expenditure are presented in columns 1, 2 and 3 respectively. Idiosyncratic fluctuations affect total and non-asset expenditure but not food expenditure, suggesting individuals were able to effectively smooth their food consumption during the year.

The coinsured and non-coinsured groups are quite similar in terms of their ability to smooth transitory shocks to income. Despite having a smaller village coinsurance network, there is no statistically significant difference in the response of coinsured and non-coinsured households to transitory shocks. We can infer from this that the latter obtain an equal degree of consumption smoothing from another source – either from self-insurance through buffer stock saving, or coinsurance with people outside the village. They are not accessing formal insurance systems, however. The liquid asset stocks of the non-coinsured are, on average, 34 percent lower than those of the coinsured group. Reflecting their reduced dependence on village coinsurance, the response of consumption to the village common income component is slightly lower among the non-coinsured group; the difference of the coefficients for the two groups is significant at the ten percent level for non-asset and food expenditure.

Table 3.7: Tests of consumption smoothing by coinsurance level

	Total expenditure	**Non-asset expenditure**	**Food expenditure**
	Log per capita	Log per capita	Log per capita
	(1)	(2)	(3)
Constant	3.299***	3.092***	2.655***
	(0.327)	(0.299)	(0.298)
Coinsured	-0.502	-0.657*	-0.683*
	(0.385)	(0.351)	(0.361)
Village income component			
Not coinsured	0.320***	0.327***	0.348***
	(0.091)	(0.084)	(0.083)
Coinsured	0.469***	0.511***	0.538***
	(0.054)	(0.049)	(0.053)
Permanent HH income component			
Not coinsured	0.357***	0.316***	0.237***
	(0.045)	(0.036)	(0.034)
Coinsured	0.271***	0.224***	0.168***
	(0.022)	(0.019)	(0.022)
Transitory HH income component			
Not coinsured	0.087*	0.089**	0.035
	(0.047)	(0.043)	(0.039)
Coinsured	0.073**	0.066**	0.057*
	(0.032)	(0.029)	(0.030)
Number of obs.	892	892	892
Adjusted R^2	0.275	0.275	0.212
Tests that coinsured and not coinsured coefficients are equivalent (F statistics):			
Village	2.00	3.62*	3.65*
Permanent	2.90*	5.17**	2.93*
Transitory	0.06	0.19	0.20

Robust standard errors in parentheses. *** = p<0.01, ** = p<0.05, * = p<0.1

3.6.4 Transfers

We now turn to the effect of prize-winning on gifts and transfers. Table 3.8 reports results from individual-level probit regression models of giving and receiving gifts, with others in the village and overall. In addition to prizes won (by the individual, in columns 1 to 8, and by the

Table 3.8: Probit models of response of individual gifts and receipts to transfers

Sample	All individuals				Coinsured		Not coinsured		All individuals		
Dependent variable	Gave gifts to someone in same village (1)	Received gifts from someone in same village (2)	Gave gifts to any individual (3)	Received gifts from any individual (4)	Gave gifts to someone in same village (5)	Received gifts from someone in same village (6)	Gave gifts to someone in same village (7)	Received gifts from someone in same village (8)		Gave gifts to someone in same village (9)	Received gifts from someone in same village (10)
Won prize									**Friend won prize**		
Cash - public	0.114	0.069	0.067	-0.049	-0.036	-0.296	0.190	0.333	Cash - public	0.148*	0.083
	(0.167)	(0.177)	(0.163)	(0.160)	(0.249)	(0.286)	(0.233)	(0.234)		(0.076)	(0.081)
Cash - private	0.322**	-0.033	0.452***	0.030	0.283	-0.089	0.380*	0.056	Cash - private	0.047	-0.030
	(0.163)	(0.184)	(0.161)	(0.158)	(0.241)	(0.282)	(0.228)	(0.254)		(0.075)	(0.081)
Livestock -	0.163	0.060	0.228	0.312**	0.003	0.108	0.315	0.073	Livestock -	0.062	0.020
public	(0.164)	(0.173)	(0.159)	(0.159)	(0.261)	(0.270)	(0.216)	(0.233)	public	(0.075)	(0.081)
Livestock -	0.139	-0.005	0.077	0.019	-0.174	-0.231	0.548**	0.326	Livestock -	-0.029	0.148*
private	(0.168)	(0.181)	(0.164)	(0.158)	(0.244)	(0.272)	(0.244)	(0.26)	private	(0.076)	(0.082)
Won prize, lagged									**Friend won prize, lagged**		
Cash - public	0.235	0.168	0.323*	0.350*	0.187	0.461*	0.210	-0.304	Cash - public	0.152*	0.028
	(0.188)	(0.205)	(0.179)	(0.179)	(0.266)	(0.275)	(0.269)	(0.345)		(0.086)	(0.094)
Cash - private	0.141	0.432**	-0.003	0.186	0.443	0.575*	-0.055	0.472*	Cash - private	-0.032	0.018
	(0.208)	(0.205)	(0.198)	(0.191)	(0.316)	(0.333)	(0.289)	(0.266)		(0.086)	(0.094)
Livestock -	0.455**	-0.130	0.496***	0.247	0.600**	0.332	0.330	-0.602	Livestock -	0.129	0.055
public	(0.182)	(0.219)	(0.179)	(0.179)	(0.271)	(0.298)	(0.259)	(0.375)	public	(0.087)	(0.095)
Livestock -	-0.071	0.202	0.070	0.229	-0.166	-0.028	0.085	0.544*	Livestock -	-0.012	0.264***
private	(0.203)	(0.203)	(0.185)	(0.178)	(0.286)	(0.303)	(0.302)	(0.294)	private	(0.087)	(0.095)
Pseudo R^2	0.086	0.093	0.096	0.076	0.082	0.096	0.117	0.138		0.086	0.102
N	2,083	2,083	2,083	2,083	1,056	1,056	1,027	1,027		1,966	1,966

All regressions include round and village fixed effects. Other control variables included (omitted where appropriate): male, coinsured, holds office, age, age squared and log household illiquid assets. Robust standard errors in parentheses. *** = p<0.01, ** = p<0.05, * = p<0.1.
^ Sum of all prizes (in GH¢) won by other villagers whom members of the household reported once having given a gift.

individual's close friends, in columns 9 and 10), we include gender, coinsurance network status, age of the household head, a dummy variable for whether the individual was a member of a community group, lagged illiquid assets, household size, round and village dummies on the right-hand side.

Considering the size of the prizes awarded, it is remarkable that the incidence of gift-giving, within the village or with outsiders, does not appear to have increased in response to winning a public cash prize. We have already discussed above how, if social norms (or the informal contracts underpinning social insurance) dictate that individuals must share windfall resources with their social network, they may be inclined to spend their money quickly rather than share it with others. However, we would expect this effect to be more pronounced for cash prizes won publicly, since even if the identities of the winners of private prizes became public knowledge eventually, the number of individuals knowing them at any time cannot be larger than for public prizes.

Conversely, we only see evidence of gifts increasing as a result of private cash prize-winning, and these gifts are from individuals with a smaller social network. With respect to this private cash prize result, however, it is notable that the lagged effect of prize-winning on receipts is positive for the same group, which seems counterintuitive. This could be explained by a few winners lending their prize money to another household on a short-term basis, and calling it a 'gift' even though it was eventually repaid (in line with the flexible loan arrangements discussed in Udry, 1990 and Udry, 1994). Aside from this seemingly artifactual result, the incidence of receipts does not respond to prize-winning. In contrast to the results of Cox and Jimenez (1992, 1995) and Jensen (2004), we find no evidence that recipients of transfers have their receipts 'crowded out' by the prizes. Consistent with the unconditional descriptive statistics reported

earlier, we conclude that there was little if any effect of prize-winning on the incidence of transfers, either given or received. Likewise, the effect of friends' prize-winning on an individual's receipts is negligible (column 10), and seems to have the wrong sign in terms of its effect on gifts.

Prizes might still have an effect at the intensive margin, even if not at the extensive margin. To test this, we estimate a Heckman regression model. Having established that prizes don't explain gift giving or receipt decisions, we exclude them from the first stage regression. We specify the first stage (the selection equation for transfer giver or recipient status) as a function of the individual's gender, whether she is coinsured, whether she holds an office, age, age squared and lagged liquid assets. The second stage regression includes only the values of prizes won by the household (divided into the four groups cash and in kind, public and private as above) and round controls. The results are reported in Tables 3.9a and 3.9b. The inverse Mills ratio and correlation of error terms between the two stages, reported in Table 3.9a, suggest that selection is not a major issue in these data.

We find that log gifts barely change with prizes won, and when they do, they counterintuitively fall rather than rise. Log receipts are likewise broadly unchanged. Indeed, the only statistically significant result is that receipts increased in response to prize-winning, which is counter-intuitive. The sum of close friends' prize winnings has no significant effect on the log of transfers, given or received. This is reinforced by our consumption model estimates, which showed a negligible effect of friends' prize-winning on current consumption. While this might not be surprising, given the aforementioned results and the fact that each winner has many friends across whom sharing is spread, it does reinforce our conclusion that redistribution of prizes was at best marginal in this experiment.

Table 3.9a: Heckman regressions – first stage

	All individuals				Coinsured		Not coinsured			All individuals^	
Dependent variable	Gave gifts to someone in village (1)	Received gifts from someone in village (2)	Gave gifts to any individual (3)	Received gifts from any individual (4)	Gave gifts to someone in village (5)	Received gifts from someone in village (6)	Gave gifts to someone in village (7)	Received gifts from someone in village (8)		Gave gifts to someone in village (9)	Received gifts from someone in village (10)
Male	0.246***	-0.192***	0.294***	-0.445***	0.106	-0.148	0.431***	-0.198*	Male	0.248***	-0.205***
	(0.069)	(0.074)	(0.065)	(0.063)	(0.094)	(0.101)	(0.103)	(0.111)		(0.070)	(0.076)
Coinsured	0.164**	0.184**	0.204***	0.129**	--	--	--	--	Coinsured	0.208***	0.251***
	(0.069)	(0.075)	(0.065)	(0.063)	--	--	--	--		(0.071)	(0.077)
Office-bearer	-0.357***	0.051	-0.320***	0.044	-0.141	0.166	-0.836***	-0.056	Office-bearer	-0.377***	0.072
	(0.137)	(0.141)	(0.123)	(0.117)	(0.164)	(0.173)	(0.290)	(0.265)		(0.141)	(0.146)
Age	0.015	-0.091***	0.040***	-0.049***	0.013	-0.028	0.004	-0.127***	Age	0.019	-0.085***
	(0.015)	(0.014)	(0.015)	(0.013)	(0.024)	(0.024)	(0.021)	(0.019)		(0.016)	(0.014)
Age squared	0.000	0.001***	-0.001***	0.001***	0.000	0.000	0.000	0.001***	Age squared	0.000*	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
Lagged illiquid	0.034	-0.115**	0.041	-0.017	-0.082	-0.273***	0.151**	0.026	Lagged illiquid	0.035	-0.131***
assets	(0.045)	(0.048)	(0.043)	(0.041)	(0.062)	(0.070)	(0.068)	(0.069)	assets	(0.046)	(0.050)
Inverse Mills ratio	0.294	-0.378	0.197	0.731***	0.513	0.009	0.322	-0.495*		0.220	-0.203
	(0.255)	(0.253)	(0.217)	(0.224)	(0.354)	(0.356)	(0.297)	(0.280)		(0.254)	(0.262)
Correl'n of errors	0.247	-0.304	0.162	0.503	0.417	0.009	0.277	-0.376		0.188	-0.175
N	1,911	1,975	1,836	1,828	966	1,013	945	962	N	1,891	1,949
Uncensored	390	294	567	721	217	151	173	143	Uncensored	370	268

Heckman model estimated by two-step procedure. First stage regression includes round fixed effects. Standard errors in parentheses. *** = p<0.01, ** = p<0.05, * = p<0.1.

^ Model with friends' prizes in second stage (see columns 9 and 10 of Table 3.9b).

Table 3.9b: Heckman regressions – second stage

Dependent variable	All individuals				Coinsured		Not coinsured		All individuals		
	Gave gifts to someone in village (1)	Received gifts from someone in village (2)	Gave gifts to any individual (3)	Received gifts from any individual (4)	Gave gifts to someone in village (5)	Received gifts from someone in village (6)	Gave gifts to someone in village (7)	Received gifts from someone in village (8)		Gave gifts to someone in village (9)	Received gifts from someone in village (10)
Prize value (contemporaneous)									**Friends' prizes (contemporaneous)**		
Cash - public	0.011	0.003	0.007	0.005	-0.005	0.000	0.013	-0.001	Cash - public	0.000	-0.001
	(0.008)	(0.014)	(0.008)	(0.009)	(0.016)	(0.028)	(0.010)	(0.017)		(0.002)	(0.002)
Cash - private	-0.007	0.007	-0.010*	-0.001	-0.001	0.001	-0.011	0.022*	Cash - private	0.000	0.000
	(0.006)	(0.007)	(0.005)	(0.006)	(0.009)	(0.008)	(0.008)	(0.013)		(0.002)	(0.002)
Livestock -	-0.004	-0.004	-0.005	-0.001	-0.021*	-0.017	0.006	-0.004	Livestock -	-0.001	-0.001
public	(0.007)	(0.009)	(0.005)	(0.006)	(0.012)	(0.020)	(0.009)	(0.010)	public	(0.002)	(0.002)
Livestock -	-0.007	0.023**	-0.020***	0.014**	0.006	0.016	-0.009	0.026**	Livestock -	0.001	-0.001
private	(0.013)	(0.010)	(0.008)	(0.006)	(0.031)	(0.019)	(0.014)	(0.012)	private	(0.002)	(0.002)
Prize value (lagged)									**Friends' prizes (lagged)**		
Cash - public	-0.004	-0.008	-0.001	-0.005	-0.004	-0.010	-0.002	-0.005	Cash - public	0.001	0.003
	(0.006)	(0.010)	(0.006)	(0.006)	(0.010)	(0.011)	(0.008)	(0.018)		(0.002)	(0.002)
Cash - private	0.001	0.010	0.002	0.010*	0.003	0.009	-0.008	0.012	Cash - private	-0.001	0.003*
	(0.008)	(0.007)	(0.007)	(0.006)	(0.009)	(0.011)	(0.015)	(0.008)		(0.002)	(0.002)
Livestock -	-0.010*	-0.003	-0.015**	0.000	-0.015*	-0.003	-0.001	0.007	Livestock -	0.000	-0.003
public	(0.006)	(0.009)	(0.006)	(0.006)	(0.008)	(0.011)	(0.010)	(0.018)	public	(0.002)	(0.002)
Livestock -	-0.012	0.009	-0.004	0.001	-0.028**	-0.013	0.003	0.013	Livestock -	0.002	0.003
private	(0.010)	(0.010)	(0.007)	(0.006)	(0.013)	(0.026)	(0.014)	(0.012)	private	(0.002)	(0.002)
Wald $\chi^2(10)$	9.15	17.10*	17.87*	9.95	14.80	3.93	8.75	18.81**		7.85	16.05*
N	1,911	1,975	1,836	1,828	966	1,013	945	962		1,891	1,949
Uncensored	390	294	567	721	217	151	173	143		370	268

Heckman model estimated by two-step procedure. Second stage regression includes village fixed effects. Standard errors in parentheses. *** = p<0.01, ** = p<0.05, * = p<0.1.

If the canonical transfer rule were applicable in these villages, we would expect receipts to fall and gifts to rise, at the very least for public cash prize-winners and those with larger social networks. We do not see this. This suggests that transfers are not very responsive to unanticipated windfalls, and therefore that any coinsurance arrangement among villagers in our sample (even one constrained by limited commitment) may not be effective in redistributing fluctuations in income in these communities. Of course, this also suggests that in this setting there are no grounds for concern about external transfers (like we gave) crowding out private intra-network transfers, at either the extensive or intensive margins.

Our results might be attenuated by measurement error in the transfer data, though as mentioned before we were extremely careful in collecting this variable. It is also possible that villagers mutually agreed that the prizes were 'outside the scope' of their coinsurance contract, and that (perhaps because the winnings weren't earned) winners were not obliged to share them.[65] However, if all earnings are ultimately fungible in a household budget, this assertion would be an admission that individuals in these communities explicitly do not smooth certain types of income shocks.

Having said this does not rule out the possibility that individuals only make requests for assistance in times of demonstrable need, requests that are honored provided the donors can afford to help. This is consistent with the loans-with-forgiveness model, discussed in Udry (1990, 1994), Fafchamps and Lund (2003) and Fafchamps and Gubert (2007), wherein windfalls would only invoke a transfer if the recipient is indebted to someone else for recent assistance. It is also consistent with a model of 'risk layering', in which there is effectively a deductible in the insurance arrangement that sets a lower bound on the size of the shock for which assistance is

[65] Since the lotteries were a repeated game, non-winners may also have expected to win later and therefore held off requesting winners to share. Since only 40% of households were winners at all during the lotteries, this seems unlikely. Limiting the sample to the last round (when all knew the game was over) does not change the results.

provided (Chantarat et al., 2008). In future research, it may be possible to formally model such an arrangement with these data.

3.6.5 Investment

Thus far we have noted that on average about 40 percent of the cash prize money appears to have been spent on consumption, and that little of the prizes was transferred. However, the follow-up survey results presented in Section 3.5 suggest many individuals bought items for business, and durable goods, with their prize winnings. In Section 3.2 we discussed how coinsurance obligations and buffer stock smoothing behavior generate a prediction that the attractiveness of investment may be distorted by one's future obligations to others, and that this distortion varies with the size and composition of an individual's social network. We showed how under a standard Coate–Ravallion transfer arrangement where individuals are prudent, those who are relatively richer than their friends may face a higher social rate of taxation on certain types of consumption or investment. In this section we test this hypothesis, using the household's stock of illiquid assets as our measure of investment capital.

We can test these predictions by estimating the effect of prize-winning on log illiquid assets. While this measure does not include buildings or land, it contains all other household assets that would be costly to liquidate and therefore represent a form of irreversible investment as motivated in our model and discussed by Fafchamps and Pender (1997) and Rosenzweig and Wolpin (1993). Furthermore, over the nine months spanned by the surveys, little construction or land exchange took place in any of these villages, so omitted investment is likely to be negligible.

We control for household wealth and interact the value of prizes won with dummies for (i)

whether the individual is coinsured, as defined earlier, and (ii) whether the individual is relatively richer or poorer than her friends. The most intuitive measure of welfare is log household per capita expenditure, which should, according to the permanent income hypothesis, best approximate a household's permanent income. Consumption is also visible enough to be useful for social comparisons, and in our model individuals' perceptions of their relative wealth are important to their investment decision.

We use as the basis for comparison the median of the individuals' close friends' per capita consumption. We generate a variable taking the value one if the individual's household consumption exceeds the median of their close friends' consumption levels, and zero otherwise. Since expenditure fluctuates during the year (due to seasonality and measurement error), around 48 percent of individuals have reversals during the five rounds, becoming relatively richer or poorer than their friends as the year progresses. Therefore, we define an individual as 'relatively rich' only if their household consumption exceeds the median of their friends' consumption more than half the time (i.e., in three rounds or more, for those households with observations for all five rounds). About 44 percent of individuals in our sample are defined as 'relatively rich' according to this measure. Since asset and transfer decisions are likely to be taken at the household level, we then define a household-level analog for this variable by calling a household relatively rich if any member is relatively rich. According to this measure, 53 percent of households are relatively richer than their social network.[66]

From the model in Section 3.2, we hypothesize that the household's stock of illiquid assets is an autoregressive process, subject to innovations from round-specific events and the effects of prize-winning (of the individual or household, and of friends). We allow the coefficients on all of

[66] The social networks of individual household members are likely to overlap, so this measure seems more appropriate than simply averaging the individual measures.

the variables except the round controls to vary according to the household's relative wealth and degree of coinsurance (using the 'coinsured' dummy variable defined in Section 6.1). Columns 1 to 3 of Table 3.10 report results from OLS regressions with log assets as the dependent variable, and lagged log assets and prizes (both interacted with the coinsured dummy) on the right-hand side. The first column uses the entire sample and does not control for a household's relative wealth in the social network. It shows that all types of prize induced investment changes, and except for public cash prizes all of these changes were among coinsured households, though the difference between coinsured and non-coinsured is not statistically significant.

Columns 2 and 3 break the sample into relatively rich and relatively poor households, as defined by our relative wealth measure. When we partition the sample in this way, we see immediately how concentrated the investment response to prize winning is among relatively poor households. The significant results in column 1 are driven by households whose members are relatively poorer than their median friend (column 2). Relatively rich households display almost no investment response to prize-winning. If the partition simply picked up the correlation of the relative wealth measure with overall wealth (as we would expect, since richer individuals hold and buy more assets, on average) then we would expect all of the responses to be concentrated among the rich. Standard models of preferences would predict that the marginal propensity to invest is higher among the rich than among the poor. Our results suggest the opposite, supporting the hypothesis that investment incentives are eroded by a social rate of taxation stemming from sharing norms. These obligations weigh more heavily on the relatively rich than the relatively poor, as predicted by our model where liquid and illiquid assets are complements.

Table 3.10: Asset regressions

Sample	OLS regression (log assets)			Fixed effects^		Alternate wealth measure (OLS)		
	All	Rel. poor	Rel. rich	Rel. poor	Rel. rich	Poor	Middle	Rich
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged log assets								
Not coinsured	0.668***	0.618***	0.750***	--	--	0.522***	0.816***	0.616***
	(0.042)	(0.054)	(0.058)	--	--	(0.062)	(0.050)	(0.123)
Coinsured	0.734***	0.735***	0.722***	--	--	0.779***	0.692***	0.780***
	(0.027)	(0.039)	(0.038)	--	--	(0.058)	(0.038)	(0.056)
Public cash prize (GH¢)								
Not coinsured	0.004***	0.006***	0.002	0.007*	-0.002	0.006*	0.005***	0.002
	(0.001)	(0.002)	(0.003)	(0.004)	(0.006)	(0.003)	(0.002)	(0.004)
Coinsured	0.003	0.007*	-0.002	0.008**	-0.004	0.000	0.006	-0.002
	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)
Private cash prize (GH¢)								
Not coinsured	0.002	-0.006	0.006	-0.008	0.005	-0.006	0.002	0.006
	(0.003)	(0.004)	(0.004)	(0.007)	(0.005)	(0.004)	(0.003)	(0.006)
Coinsured	0.003***	0.003**	0.002	0.004	0.003	0.003	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)
Public livestock prize (GH¢)								
Not coinsured	-0.001	-0.003*	0.002*	-0.005	0.003	-0.002	0.002	0.003
	(0.001)	(0.002)	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)
Coinsured	0.002**	0.005***	-0.001	0.007**	-0.001	0.003	0.003***	-0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.001)	(0.002)
Private livestock prize (GH¢)								
Not coinsured	0.002	0.001	0.002	0.000	0.001	0.002	0.005	0.002
	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)	(0.002)	(0.003)	(0.003)
Coinsured	0.004***	0.006***	0.002	0.008**	0.000	0.007***	0.002	0.002
	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)
N	1,193	599	594	599	594	327	604	258
Households	306	154	152	154	152	83	154	69
Adjusted R^2	0.620	0.624	0.620	0.096	0.019	0.633	0.613	0.658

Dependent variable is log household illiquid assets in (1) to (4) and (6) to (8), and change in log household illiquid assets in (5) and (6). Round effects included in all regressions. Robust standard errors in parentheses. *** = p<0.01, ** = p<0.05, * = p<0.1.

The effect is also reinforced by the size of the coinsurance network; other than for public cash prizes, investment among the relatively poor is again concentrated among coinsured households. This supports our earlier hypothesis since, controlling for social network position, individuals with more friends have greater security on the downside (if they are relatively poor), and more obligations on the upside (if they are relatively rich). Though the coefficients are not statistically significant, these results are reversed among the relatively rich, where the response of investment to prize-winning is greater for those with smaller social networks.

As a robustness test that the relative wealth findings do not simply reflect absolute wealth effects, we consider a household fixed effects specification. This absorbs any persistent differences in wealth and other unobservables across households. Since lagged log assets are highly correlated with the household fixed effect (varying only intra-year), we exclude them from this specification. The results are presented in columns 4 and 5 of Table 3.10. They mirror the previous regression results, with investment responding positively only for relatively poor households, except for the coefficient on private cash prizes (which has a similar magnitude, but whose standard error increases).

Finally, we consider an alternative classification of relative wealth. Since around one third of household members changed position in the social network during the year – from relatively rich to relatively poor, or vice versa – we account for this by defining an alternative measure that takes three values: 'poor', if the household member was relatively poor all of the year; 'middle', if they changed position; and 'rich', if the they were relatively rich throughout the year. Most of the 'middle' households are likely to be similar to their median friends, with measurement error generating fluctuations between categories. The results from this decomposition are presented in columns 6 to 8 of Table 3.10. The estimates become less stable because of the smaller sample

sizes, so should be interpreted with caution. Among the relatively poor and middle households, investment responds significantly to public cash and livestock prizes. The relatively rich register no investment response to prize-winning of any sort, consistent with our prior results.

The result that households whose members are well-integrated into the village social network and relatively poorer than their peers are more likely to invest a positive income shock supports the hypothesis that sharing norms distort investment incentives. We find no evidence that individuals invest money to 'keep it out of the hands of others', because such investment would be stronger for public cash prizes, and most pronounced for those with the greatest sharing burden – to wit, the relatively rich.

Our model explains how investment may be less attractive among individuals who are richer than their peers because their anticipated gains from investment are subject to a social rate of taxation through future claims from others. This rate of taxation is increasing in the relative position of an individual vis-à-vis her coinsurance network peers. It is also increasing in the size of that network, since having more friends increases the amount of money that must be shared.

3.7 Policy implications

Our experiment highlights the areas in which individuals' budget constraints are truly binding. The nature of the prize – cash or livestock – made a large difference to its use. Goat prizes were much more likely to be kept as an 'investment' than was cash, which is perhaps not surprising given the high transaction costs of selling livestock in the village. This lends support to the strategies of some NGOs to provide livestock to the poor as a source of livelihood. Such transfers are not fungible injections of capital, but guided interventions. Aside from transaction costs, the result could also be explained by theories from behavioral economics such as the

endowment effect (Kahneman et al., 1990).

The strong response of household consumption and illiquid asset investment to cash prizes (both public and private) may also reflect individuals' inability to save their money securely. Some have argued that claims from others erode savings, encouraging individuals to spend their winnings quickly. Our results on consumption suggest that while a large part of cash prizes is spent within the first month, this does not appear to be due to fear of requests from others. In the follow-up survey, winners reported that requests from friends to share their prizes were uncommon. By controlling the publicity of the prizes, so that some were public information and others private information, we find little evidence that individuals spent publicly-won cash prizes faster than privately-won prizes in order to evade claims from others. Our estimates of the transfer response to public prize-winning are negligible, and actually more significant out of private prizes. There is also no evidence of prizes crowding out transfers.

The experiment provides a novel insight into the effects of village social network characteristics on individual and household consumption, transfer and investment behavior in response to a positive income or wealth shock. The notion of a social rate of taxation on investment parallels company tax arrangements in the formal economy. Insurance is provided on the downside, in the sense that losses are compensated by tax credits, and is paid for on the upside by taxation of profits. However, in the village coinsurance system this taxation is asymmetric by social position, generating an inverse relationship between relative wealth and investment incentives. If rates of return on investment are constant with respect to wealth, and wealth can only be increased through investment in complementary goods, then our model illustrates that individuals in relatively 'democratic' social networks (i.e., where the average wealth of a person's friends does not vary much with her own wealth) may be prone to an

'investment trap'. In such a scenario, the disincentive to invest (through social taxation of gains) may constrain richer households' wealth trajectories as long as they remain embedded in the village social network.

This is an interesting consequence of a system that ostensibly provides redistribution and social support in lieu of formal institutions, and might partly explain the inability of small businesses in developing countries to invest and grow. Increasing formal support for the poor (by providing a formal safety net, for example) could weaken the demands on the relatively rich to share their gains, and possibly have the indirect result of increasing their appetite for investment. If social norms do not change, social networks would need to become more concentrated over time, in wealth terms, in order for the returns on investment to outweigh taxation due to sharing norms. Exploring this hypothesis further, through experiments and comparative studies of social networks in village and urban areas, is a promising avenue for future research.

3.8 Conclusions

In this paper we developed a dynamic two-asset model of the interaction between a buffer stock savings strategy and a coinsurance arrangement, and derived hypotheses on how coinsurance arrangements and the structure of the village social network affect consumption, investment and transfers. Our model incorporates two commonly-observed features of households in rural communities of developing countries: an inability to borrow, and an obligation to share resources with others in the community. The model is one of the first to formally characterize the interaction between these features, and the first to evaluate their impact on behavior using experimental data.

We tested the model's hypotheses using data from a unique field experiment in Ghana.

Three hundred and twenty cash and livestock prizes of various amounts, the largest exceeding one month's mean per capita consumption, were distributed by lottery among survey respondents throughout 2009. Prizes varied in value, type (cash or livestock) and in whether they were awarded at a public ceremony or privately to the recipient. We used a household survey to track the effect of these prizes on consumption, investment and transfers. We find little evidence of transfers responding to prize-winning, and no evidence that publicly-given prizes were subject to more requests for sharing than were private prizes. Rather, we found that the bulk of cash prizes were spent within the first month following the lottery, partly as investment in illiquid assets.

Our findings contribute to the literature on the complexities and implications of informal insurance arrangements in developing countries. They link back to the work of Cox and others on crowding out, illustrating how policy makers need to bear in mind existing social norms and arrangements when designing interventionist policies (Cox and Jimenez, 1992; Cox and Jakubson, 1995; Cox and Jimenez, 1995; Cox, Hansen and Jimenez, 2004). We find support for the claims of Platteau (2009) about the 'social rate of taxation' of individual gains by those in their immediate community, but in a nuanced way. Rather than encouraging investment in illiquid assets as a means of avoiding obligations, sharing norms impose a social rate of taxation on prospective returns from investment.

We find robust evidence of an 'investment trap' due to social obligations. Those who are richer in their social network expect their investment returns to be more heavily taxed by social obligations than those of relatively poorer individuals. Controlling for wealth, we show that individuals who are relatively richer than their friends are significantly less likely to invest their prize winnings. This result is more pronounced for individuals with a larger village social network, suggesting that larger coinsurance networks provide the relatively poor with greater

certainty over future consumption, and therefore more incentive to invest, while imposing a greater claim on the relatively rich, and thereby reducing their prospective returns from investment. Our findings also call into question the appropriateness of the standard one-asset Coate–Ravallion limited commitment model as a representation of real-world coinsurance arrangements, since that model does not predict asymmetry in the social rate of taxation across individuals. Instead, the findings are consistent with a two-asset model, in which one asset is non-transferable or outside the scope of the arrangement.

In interpreting our findings, it is important to note that while the shocks used here to study individual and household behavior are random, the *nature* of the shock may play a role. We cannot conclude from this study that gifts and transfers do not respond to any type of positive income shock; it may be the case that 'lottery prizes' do not fall under an otherwise very extensive coinsurance contract among villagers. However, interpreting the findings about expenditure and investment depends on one's point of view about fungibility. To the extent that cash prizes are simply cash, the measured effects should be identical to those stemming from any other shock. If some sort of mental accounting is practiced, whereby for instance individuals 'treat themselves' with unearned winnings, one would need to be more circumspect in extrapolating our conclusions to behavior in general. Finally, the usual caveat about external validity applies here; the study describes behavior in four villages in southern Ghana, and the results may not be predictive of behavior elsewhere. Nevertheless, it is hoped that the evidence presented here inspires further research in other settings into the potential adverse impact of social obligations on consumption and savings behavior in rural communities.

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APPENDICES

Technical Details on the 2009 Household Survey

1 Survey design

1.1 Introduction

The household survey is part of a USAID project called the Assets and Markets Access Collaborative Research Support Program (AMA CRSP), a long-term empirical study of idiosyncratic shocks and welfare dynamics in Ghana, Bangladesh and Ethiopia.
The survey was conducted in four villages in Akwapim South district, Eastern Region, Ghana in 2009. Questionnaires were administered in five rounds from February to November 2009, with each household interviewed once every two months.

1.2 Organization of the survey

The survey villages were initially selected because the district was the site of rapid growth in the export agriculture industry (specifically, of pineapple) in the late 1990s. Four villages were selected non-randomly from those in the district. The villages are Konkonuru, Oboadaka, Pokrom and Darmang-Ahweriase.

Within each village, around 60 households were randomly selected for participation in the first wave in 1997-98. In Darmang, given its population was barely more than 60 households, all households were selected. Table 1 shows the actual number of households remaining after refusals etc. The second wave in 2004 was based on the same sample, but due to attrition the sample was smaller. The 2009 sample was rebuilt by random resampling, to obtain a targeted 70

households in each village. The existing sample was retained, but those households which had disappeared or chosen not to take part were replaced by new households selected at random from that village. In a small number of cases, only one of the spouses from a former sample household remained in the village (because of death, divorce or migration). We included these remaining 'single spouses' in the sample but did not count them towards the 70-household target.

Table 1: Survey samples in the Akwapim South study

Wave		Konkonuru	Oboadaka	Pokrom	Darmang	Total
1997-98	Households	54	51	51	51	213
	Individuals	112	102	111	106	429
2004	Households	44	38	38	39	159
	Individuals	90	89	81	90	350
2009	Households*	81	76	78	81	316
	Individuals	151	149	147	158	605

* Includes single-headed households.

The survey is unusual in that almost all of the questions are posed to both the household head and spouse(s). A full breakdown of the number of participants in each wave is given in Table 1. The district is patrilineal, so the head is usually male and the spouse(s) female. A small number of households had multiple wives; in these cases all wives were interviewed. The 1997-98 and 2004 survey instruments comprised sections on assets, consumption, land assets, farm business activity, non-farm business and income, gifts and transfers, loans, family background and marital attitudes. All of these sections (effectively unchanged) were fielded again in 2009 to generate consistent panel data. In addition, we added modules on social networks, long-term shocks and perceptions of poverty, membership of organizations and cooperatives, education and

household characteristics. The questionnaires follow in this appendix. We also conducted two field experiments designed to study the effects of financial and non-financial windfalls on savings, consumption and sharing behavior, and the willingness of individuals to contribute to local public goods. Details on these experiments can be found in Chapters 2 and 3 of the dissertation.

1.3 Sample issues

The initial sample in 1997-98 was 60 households selected at random in each village. Due to attrition, we were able to identify just over half of these households willing to participate in 2009. To reach a target sample size of 70 households in each village, we augmented these remaining households with additional households from each village, using random sampling stratified by age group. Details on attrition and the resampling are presented in Table 2.

The resampling was conducted as follows. We visited the villages in the fourth week of January and interviewed someone from every household in the village with a brief demographic survey. We asked the household head (or designated alternate) for the names and ages of the head and spouse(s), household size, the household's location and the residential history of its occupants. From this listing we identified households in the existing sample and asked whether they wished to participate in the survey again in 2009. Of the non-sample households, those with both a head and spouse present were retained for the resampling. We divided this subset into three groups based on the age of the head (under 30, 30-64, and 65+). These age categories were chosen because households with heads under 30 could not have been selected for the first wave in 1997, and older-headed households in the original sample were subject to greater attrition. We then selected enough households so that, combined with the existing sample households who

agree to participate, we had 70 households in each village with proportions of each age group close to those of the village. Newly selected households which refused to participate were replaced by the next household from that age category on a randomized list.

Table 2: Attrition and resampling

	Konkonuru	Oboadaka	Pokrom	Darmang	Total
Original sample					
1997-98	54	51	51	51	207
2004	44	38	38	39	159
Located in 2009	44	40	43	48	175
Dropped/Refused	1	1	0	0	2
Remaining	43	39	43	48	173
Single-headed	12	7	10	11	40
Dual-headed	31	32	33	37	133
Resampling					
Young	11	14	12	12	49
Middle	28	23	20	14	85
Old	0	1	5	7	13
Total	39	38	37	33	147
Total sample 2009					
Dual-headed	70	70	70	70	280
Single-headed	12	7	10	11	40
Total	82	77	80	81	320

1.4 Definition of a household

We adopt the standard LSMS definition of a household as "a group of individuals which normally eat from the same pot". However, this was augmented by a condition that to be a member of the household, an individual must have satisfied the LSMS definition for at least one month (30 days) in the past year. This was done to rule out the inclusion of itinerant members or children living elsewhere.

The household head was defined as the most senior member of the household. This designation was usually unambiguous, but if not, the head was to be the person who would normally represent the household in its dealings with other households. The head and his/her spouse(s) were the only people interviewed from each household.

1.5 Timetable

The survey ran from January to November 2009. In January we recruited and trained the enumerators. We conducted the listing in the second-last week of January, then conducted the resampling and selected a pretest group to test the instruments. Pretesting and revision of the survey instrument took place in the last week of January. The survey rounds began in the first week of February. Each of the five rounds lasted two months; the full timetable is set out below.

There were two teams of enumerators in the field, four in each village (one of whom was designated a supervisor). All of the sample households in a village were interviewed over the course of the month, with two villages being surveyed concurrently. At the end of the month, the enumerators will move to the second two villages to spend a month there conducting the second half of the round. The social networks module will be administered by a separate team of enumerators in February and March, running on the same schedule as the general survey team but interviewing each household four times over the course of the month.

In each round, respondents answered a standard questionnaire on income, farming, business activity, assets, consumption and transfers/loans. This was augmented by a full social network survey in the first round, and some short one-round modules on other issues in subsequent rounds. Each household was visited once in each round for the general survey, and an additional four times in February/March for the social networks module.

The following table lists the commencement and completion dates for each activity in the survey. Data collection rounds and experiments took place two villages at a time. Group A contains Konkonuru and Oboadaka. Group B contains Pokrom and Darmang, whose data collection and experiments occur one month after Group A.

Table 3: Calendar of household survey interviews

Round or Activity	Date Commenced	Date Completed
Listing	22 January	26 January
Pretest	28 January	30 January
Round 1, Group A	7 February	2 March
Round 1, Group B	9 March	6 April
Round 2, Group A	20 April	15 May
Round 2, Group B	18 May	10 June
Round 3, Group A	17 June	8 July
Round 3, Group B	15 July	5 August
Round 4, Group A	12 August	2 September
Round 4, Group B	9 September	30 September
Round 5, Group A	7 October	28 October
Round 5, Group B	4 November	25 November

1.6 Social networks module

The social networks module was designed to map the entire in-sample social network in each of the four study villages. We collected detailed information on each friendship between sample members.

The social networks module was conducted during Round 1, in parallel with the standard household survey. This was achieved by having a second enumerator team in the village during

the first round, specifically conducting the social networks survey. Each respondent was therefore interviewed twice during this round.

The questionnaire (a blank copy of which is included following the household survey questionnaire below) was customized for each respondent. The names of all 150 sample members in the village (excluding the respondent) were listed in column 1 (over multiple pages). Due to concern about respondent fatigue (since each respondent was being asked about their friendships with 150 other villagers), we randomized the list of names on each individual's questionnaire. This enabled us to test whether responses varied systematically as the enumerator progressed down the list. There was no evidence of a systematic relationship between responses and name order.

Early in the listing, we discovered that names are very fluid in the survey area. Many individuals have a formal name and (possibly more than one) nickname, and are only known in the village by their nickname. However, they had provided us with their formal names. We therefore returned to each household and asked each respondent to tell us all the names by which they were known. For each individual, all of their names were listed on the social networks questionnaire and the respondent quizzed about each one. If the respondent said they did not know of the person, the enumerators were directed to probe further by mentioning the name of the person's spouse. This occasionally elicited a different response.

Instructions to Enumerators

1.1 Tasks of the interviewers

Your role as an interviewer is crucial to the survey. The quality of the data will depend on the quality of your work. You should keep in constant touch with your supervisor and inform him of any problems you encounter in your work in the field. The supervisor will provide you with all the necessary materials and instructions and will collect and check your work, helping you solve any problems that arise.

Your principal task is to conduct at least 2 interviews per day during the survey period. Each enumerator will be assigned 35-40 individuals to interview each month, and it is imperative that these interviews take place before the end of the month because at that time the survey team will move to the other village.

You must follow strictly all instructions in this manual. Read all questions exactly as they appear on the questionnaire. You will be provided with the following materials for use in the interviews:

- Questionnaires
- Instruction manual
- Briefcase/satchel
- Note pad
- Pencils/erasers

In addition, your supervisor will be equipped with:

- 2 GPS units (for plot mapping)
- Cell phone credit (for communication with ISSER).

1.2 Relations with the supervisor

You should always follow the advice given to you by your supervisor, who is the representative of the Project Directorate in the field. He will assign you work at the beginning of each survey round. In order to satisfy himself that your work is up to standard, your supervisor will carry out the following checks in the field:

- He will examine in detail all questionnaires you complete, to verify that each interview has been fully and properly carried out.
- He will make random visits to some of the households that you have already interviewed to make sure that you went to the correct addresses.
- He will observe three more of our interviews in a cycle to evaluate your method of interviewing. You will not be informed in advance.
- Each day he will discuss your work with you and make regular reports to the Project Directorate on your performance in the field.

Your supervisor is the link between you and the survey organization. Just as you will receive instructions from him, you must inform him of any difficulties or problems that you encounter. For instance, if you do not understand a procedure or the meaning of a question in the questionnaire, you should ask your supervisor for an explanation.

1.3 Checking the completed questionnaire

After finishing each interview, you must verify that all the sections have been filled out correctly and legibly. You must make sure that you have asked all of the relevant questions and recorded the answers on the questionnaire. Finally, you must complete the observations sheet, and record the completion of the section on the household's survey cover sheet.

This must be done immediately after the interview, before you hand in the questionnaires to your supervisor, and most importantly, before moving on to another household or leaving the village.

Although you may correct minor errors due to having written down the answers badly, you must never under any circumstance make any other changes to the completed questionnaire without asking the respondent the same question again. Do not copy the information you have collected into a new questionnaire. At the end of each day's work, all filled questionnaires must be submitted to your supervisor for editing. Errors detected must be corrected before the end of the month, by re-visiting the relevant household.

1.4 Questions rejected by the data entry system

Your work will also be reviewed by the data entry applications, which will carry out checks on the answers to various questions, parts and sections of the questionnaire. After reviewing the data entry print-outs, your supervisor will circle in red ink all the answers in the questionnaire that were rejected by the data entry program, and return the questionnaire (if necessary) to you. You should resolve the highlighted problems in consultation with your supervisor immediately.

1.5 Arrival in the community

The team will arrive in the community a day before the start of the survey. Accompanied by the interviewers, the supervisor will visit the chief, assemblymen, unit committee members and other prominent individuals to introduce the team and discuss the survey program.

2.5.1 Finding the address

First you should look for the address written on the first page of the questionnaire and make sure that it is the household of the head indicated. Sometimes you might have difficulties finding a household. If this happens, you should stop and ask advice from your supervisor.

2.5.2 Explanation of the survey

The first step after meeting village formalities and constructing the sampling frame will be to approach the selected households about participating. On the first visit to a household, the first thing you should do is greet everyone, introduce yourself and say that you are working for ISSER/Cornell University. You should show your interviewer's card in all cases. You must explain that:

- You are conducting a survey designed to learn how households cope with unexpected events. The purpose is to find out about patterns of income, consumption, assets, gift giving, loans and social networks in four villages in Akuapim South region. The survey is very important for planners to learn how to help villagers cope with unexpected events, and to improve the effectiveness of government programs.
- Their household has been randomly selected to participate in the survey.

2.5.3 Obtaining consent

You must then provide each potential participant (head and spouse(s)) with a copy of the consent form, which describes the survey, outlines the requirements for and consequences of participation, and gives them a chance to decide freely whether to participate. Offer them either the English or Twi version, as they desire. If they cannot read it personally, another person or

you must read it aloud in full to the respondent. You must spend time with the individual explaining the details of the form: the nature of the survey, requirements of participation, anticipated risks and benefits from participating, indirect benefits, and the terms of the commitment to participate.

Stress that although there are parts of the survey which ask about sensitive and potentially embarrassing information, this information will be used for research purposes only, kept confidential at all times, and not published in a form which allows anyone to link respondents and their information. The survey is being conducted by researchers at universities who wish to learn more about village behavior, and not by a government or for tax purposes. The survey team will keep the surveys secure after they are completed, and the data will always be kept private. Only a few individuals will be authorized to see their answers in connection with their name or identifying details.

Some individuals may nevertheless not wish to answer certain questions in the survey. Be frank with them that there are some sensitive questions. They have the right to refuse to answer any question. Discourage them from refusing to participate in the survey simply because some questions might be sensitive. They can choose which questions to answer, and will not be punished or lose compensation for refusing to answer a question. Although we would strongly encourage all participants to commit to participating for the full year, they have the right to leave the survey at any time.

The ethics guidelines specify that individuals must be given time to consider their participation before deciding to consent. If an individual chooses to consent on the spot, however, this is okay. Otherwise, arrange to return the next day to get their decision, and to schedule an interview if they agree.

2.5.4 Scheduling an interview

Once your supervisor has obtained signed consent forms from both head and spouse(s), you must arrange a time to return for the first interview with your respondent. There is no pre-defined order of interviews; it will be your responsibility to schedule interviews so that all of them can be completed within the month. You should try to accommodate the respondents' schedules and avoid disrupting their activities or those of other family members, but emphasize the importance of their keeping the appointment so as not to disrupt your appointments with other households.

2.5.5 Confirming the interview

You should contact each respondent at least a day before the interview. The purpose of this visit is to introduce yourself and confirm that the interview will take place the next day.

2.6 The interview

You must be careful to follow all the instructions set out in this manual, the most important of which is to ask the questions exactly as they are printed in the questionnaire. You must record the responses directly into the respective answer boxes on the questionnaire during the interview. Do not record answers on scraps of paper, in your notebook, or in the margin of the questionnaire. Neither should you count on your memory to fill in the answers after you have left the household.

2.6.1 Tempo of the interview

You must maintain the tempo of the interview. In particular, avoid long discussions of the questions with respondents. If the respondent gives you irrelevant or complicated answers, do not break in too suddenly, but listen to what they are saying and then lead him/her back to the original question. Remember that *you* are running the interview, and therefore *you* must be in control of the situation at all times.

2.6.2 Objectivity of the interviewer

It is extremely important that you remain absolutely neutral about the subjects of the interview. Most people are naturally polite, particularly with visitors, and they tend to give answers and adopt attitudes that they think will please the visitor. You must not express surprise, approval or disapproval about the answers given by the respondent, nor must you tell him/her what you think about these things yourself.

You must also avoid any preconceived ideas about the respondent's ability to answer certain questions or about the kind of answer s/he is likely to give. Your most important task is to read the questions exactly as they are written on the questionnaire.

2.6.3 Privacy of the interview

All of the data collected are strictly confidential. Any breach of confidentiality is forbidden by law. In principle all the questions should be asked in complete privacy to ensure that the answers remain confidential. The presence of other people may cause embarrassment to the respondent and influence his/her answers.

The following sections of the survey may be particularly sensitive:

- Assets
- Gifts and loans
- Education
- Marital attitudes
- Social networks

At the start of these sections you should warn the respondent that the questions may be sensitive, reiterate the privacy of the interview, and politely ask any other individuals watching to respect the privacy of the respondent.

2.6.4 Setting of the interview

This survey is concerned with the different responses and attitudes of husbands and wives. It is therefore very important that each spouse be interviewed apart from his/her partner. *Under no circumstances* are you to interview someone with their spouse present. Some questions ask the wife, for example, what her husband has sold. We do not want to know the truth about what he has sold from her, we want to know what she thinks. For this reason, it is essential that she be interviewed apart from her husband. If the respondent does not wish to be interviewed alone, they may have someone else present, but insist that it not be their spouse.

2.6.5 Conclusion and plans for next visit

Before leaving, you must thank the respondent for their time. Explain that a team member will return in two months for another interview, and that it is important that they participate again at that time.

2.7 Completing the questionnaire

Every round, each household will be visited two or three times. One enumerator will interview the head, and another will interview the head's spouse(s). After each visit, each enumerator must record the interview in the completion checklist on the cover sheet for that household. Code the result of the survey COMPLETED if all sections were done; PARTIALLY COMPLETED if the respondent refused to complete some sections, or if you were interrupted and must return to that household this round; RESPONDENT NOT AVAILABLE only if the respondent is definitely uncontactable for the month (eg travelling); REFUSED if they would not be interviewed. If there is any other reason, write 6 for OTHER along with a note in the 'Observations' section of the sheet. If the survey took place, fill out the other details. *Whether or not the survey was completed, return the questionnaire to your supervisor for storage and review.*

2.7.1 Observation sheet

You must also fill out the observation sheet. You should indicate on this page how much the respondent was willing to cooperate, any problems they had in answering any of the questions (including any which were refused because of privacy concerns), any unfavorable circumstances, and any comments you wish to make for the benefit of the supervisor. You should fill out this section immediately after the interview, but never in the presence of the respondent.

2.7.2 Conduct of the interviewer

The interviewer must observe the following rules:

- You must be courteous towards everyone (the respondent, his/her family and friends, the supervisor, other members of the team and everyone else involved). Your behavior can have an enormous impact on people's opinions in the survey villages.
- You must avoid disturbing or upsetting anyone by your behavior.
- You must be properly dressed, so that the respondent will be inclined to trust you as a reliable and responsible person.
- You must arrive punctually for interview appointments, and never keep a respondent waiting.
- You must exercise patience and tact in conducting the interview, to avoid antagonizing the respondent or leading him/her to give answers that are not in conformity with the facts.

Cornell University

Cornell University
and
Institute of Statistical, Social and Economic Research (ISSER)

AMA-CRSP Survey of Risk Coping and Social Networks in Village Ghana

ISSER University of Ghana Knowledge for Development

IDENTIFIERS

ROUND NUMBER: ____ DATE (dd/mm/yy): ____ ____ ____

VILLAGE NAME: ____ VILLAGE CODE: ____

HOUSEHOLD NUMBER: ____ GPS COORDINATES: N ____ ____ ____

REPLACEMENT HOUSEHOLD? ____ YES..1 NO...2 W ____ ____ ____

NAME(S) OF HOUSEHOLD HEAD: ____

NAME OF RESPONDENT: ____ CODE: ____

INTERVIEWER: ____ CODE: ____

SUPERVISOR: ____ CODE: ____

DATA ENTRY OPERATORS: ____ CODE: ____

____ CODE: ____

VILLAGE CODES
DARMANG.....1
POKROM.....2
OBOADAKA.....3
KONKONURU.....4

REMARKS / OBSERVATIONS

COMPLETION CHECKLIST

	Result CODE	Interviewer ID CODE	Language CODE	Translator Used? YES...1 NO....2	Date Completed DD	MM	YY	Start Time HH	MM	End Time HH	MM
Primary interview											
Supervisor check interview (if required)											
ISSER office review											
Data entry											

RESULT CODES
COMPLETED.....1
PARTIALLY COMPLETED...2
RESPONDENT NOT AVBL...3
REFUSED.....4
OTHER.....5

LANGUAGE CODES
ENGLISH.....1
TWI.....2
OTHER (SPECIFY).....3

Village	HHN	Respondent's name	ID Code	Date	Round

HOUSEHOLD CHARACTERISTICS

INTERVIEW HOUSEHOLD HEAD FOR THIS SECTION

1. What is your religion?

```
CATHOLIC..........1      SPIRITUALIST.....6
ANGLICAN..........2      OTHER CHRISTIAN....7
PRESBYTERIAN.....3       MUSLIM.............8
METHODIST.........4       TRADITIONAL.....9
PENTECOSTAL.....5        NO RELIGION.....10
```

2. What ethnic group do you belong to?

```
ASANTE............1       AKYEM.............5
AKWAPIM...........2       OTHER AKAN.....6
FANTI.............3       OTHER.............7
KWAHU.............4
```

3. a. Do you own this dwelling?

```
YES....1 (>> 4)
NO.....2
```

   b. Who is the owner?

```
PARENT.............1
OTHER RELATIVE.....2
LINEAGE............3
EMPLOYER...........4
OTHER (SPECIFY)....5
```

4. Do other households share this dwelling?

```
YES....1
NO.....2
```

5. How many rooms are there in the dwelling?

6. Where does your household get its drinking water?

```
INDOOR PIPE/TAP....1     WELL WITH PUMP.....6
VENDOR/TRUCK.....2       WELL WITHOUT PUMP..7
NEIGHBOURING HH....3     RIVER.............8
PRIVATE OUTSIDE          RAINWATER.........9
  PIPE/TAP.....4         OTHER
PUBLIC PIPE/TAP....5       (SPECIFY).....10
```

7. What type of toilet is there in your household?

```
FLUSH TOILET/WC......1
PIT LATRINE.........2
PAN/BUCKET..........3
KVIP................4
NONE................5
```

8. What is the main source of lighting you use?

```
ELECTRICITY.........1
GENERATOR...........2
KEROSENE LANTERN.....3
BOBO/GAS/CANDLE......4
BATTERY TORCH.....5
```

9. What is the main floor covering in this dwelling?

```
EARTH/MUD...........1
WOOD................2
STONE/BRICK.........3
FIBREGLASS..........4
CEMENT/CONCRETE.....5
OTHER (SPECIFY).....6
```

10. What is the main roofing material?

```
THATCH (GRASS/STRAW).1
WOOD................2
CORRUGATED IRON/ZINC.3
CEMENT/CONCRETE.....4
ASBESTOS............5
OTHER (SPECIFY).....6
```

11. What is the main material used for the building's walls?

```
MUD/MUD BRICKS.....1
WOOD...............2
CORRUGATED IRON.....3
STONE/BURNT BRICKS...4
CEMENT/SANDCRETE.....5
OTHER (SPECIFY).....6
```

Village	HHN	Respondent's name	ID Code	Date	Round

HOUSEHOLD ROSTER

HOUSEHOLD HEAD, FIRST SPOUSE AND ALL CHILDREN EVER BORN TO HER (INCLUDING CHILDREN DECEASED OR LIVING ELSEWHERE)

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	**Relation to head**	**Name** WRITE THE PERSON'S COMMONLY USED NAME OR NICKNAME, FOLLOWED BY THEIR FORMAL NAME (IF ANY) IN PARENTHESES	**Sex** MALE....1 FEMALE..2	**Is [...] alive?** YES.1 NO..WRITE DATE OF DEATH AND >>NEXT PERSON	**Age**	**Child of head?** YES..1 NO...2	**Does [...] currently live here?** YES..1 (>>10) NO...2	**Where does s/he live?** LOCATION CODE	**Highest school level attended** SCHOOL LEVEL CODE	**Highest grade achieved** GRADE NUMBER	**Occu-pation** OCCU-PATION CODE	**Marital status** (If 16+) MARITAL STATUS CODE
100	Head											
101	Spouse 1											
102	Child											
103	Child											
104	Child											
105	Child											
106	Child											
107	Child											
108	Child											
109	Child											
110	Child											
111	Child											
112	Child											
113	Child											
114	Child											
115	Child											

LOCATION CODES

DAMAN/AHWERIASE.....1
POKROM/NSABAA.....2
OBOADAKA/KWAMEKROM..3
KONKONURU.....4
ABURI.....5
NSAWAM.....6
EASTERN REGION (RURAL) 7
EASTERN REGION (URBAN) 8
ACCRA.....9
OTHER URBAN.....10
OTHER RURAL.....11
NOT IN GHANA.....12

SCHOOL LEVEL CODES

NONE.....0
PRIMARY.....1
MIDDLE OR JSS.....2
SENIOR SEC, TECH, COMMTY OR TRAINING COLLEGE....3
POST-SEC, NURSING, POLY..4
UNIVERSITY.....5

OCCUPATION CODES

FARMER.....1
TEACHER.....2
TAXI/TRO-TRO DRIVER....3
TRUCK DRIVER.....4
ARTISAN.....5
CONSTRUCTION WORKER....6
FACTORY WORKER.....7
MASON.....8
CARPENTER/CARVER.....9
HERBALIST.....10
HAIRDRESSER.....11
HEALTH WORKER.....12
OFFICE WORKER.....13
SHOP ATTENDANT/TRADER.14
BAKER/COOK.....15
PRIEST.....16
ELDER.....17
STUDENT.....18
UNEMPLOYED.....19
NOT IN LABOR FORCE....20
OTHER (SPECIFY).....21

MARITAL STATUS CODES

MARRIED.....1
CONSENSUAL UNION...2
DIVORCED.....3
SEPARATED.....4
WIDOW/ER.....5
NEVER MARRIED.....6

Village	HHN	Respondent's name	ID Code	Date	Round

HOUSEHOLD ROSTER

SECOND SPOUSE (IF APPLICABLE) AND ALL CHILDREN EVER BORN TO HER (INCLUDING CHILDREN DECEASED OR LIVING ELSEWHERE)

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	**Relation to head**	**Name**	**Sex**	**Is [...] alive?**	**Age**	**Child of head?**	**Does [...] currently live here?**	**Where does s/he live?**	**Highest school level attended**	**Highest grade achieved**	**Occu-pation**	**Marital status** (If 16+)
		WRITE THE PERSON'S COMMONLY USED NAME OR NICKNAME, FOLLOWED BY THEIR FORMAL NAME (IF ANY) IN PARENTHESES	MALE....1 FEMALE..2	YES.1 NO..WRITE DATE OF DEATH AND >>NEXT PERSON		YES..1 NO...2	YES..1 (>>10) NO...2	LOCATION CODE	SCHOOL LEVEL CODE	GRADE NUMBER	OCCU-PATION CODE	MARITAL STATUS CODE
201	Spouse 2											
202	Child											
203	Child											
204	Child											
205	Child											
206	Child											
207	Child											
208	Child											
209	Child											
210	Child											
211	Child											
212	Child											
213	Child											
214	Child											
215	Child											

LOCATION CODES

DAMAN/AHWERIASE.....1
POKROM/NSABAA.....2
OBOADAKA/KWAMEKROM..3
KONKONURU.....4
ABURI.....5
NSAWAM.....6
EASTERN REGION (RURAL) 7
EASTERN REGION (URBAN) 8
ACCRA.....9
OTHER URBAN.....10
OTHER RURAL.....11
NOT IN GHANA.....12

SCHOOL LEVEL CODES

NONE.....0
PRIMARY.....1
MIDDLE OR JSS.....2
SENIOR SEC, TECH, COMMTY OR TRAINING COLLEGE....3
POST-SEC, NURSING, POLY..4
UNIVERSITY.....5

OCCUPATION CODES

FARMER.....1
TEACHER.....2
TAXI/TRO-TRO DRIVER....3
TRUCK DRIVER.....4
ARTISAN.....5
CONSTRUCTION WORKER....6
FACTORY WORKER.....7
MASON.....8
CARPENTER/CARVER.....9
HERBALIST.....10
HAIRDRESSER.....11
HEALTH WORKER.....12
OFFICE WORKER.....13
SHOP ATTENDANT/TRADER.14
BAKER/COOK.....15
PRIEST.....16
ELDER.....17
STUDENT.....18
UNEMPLOYED.....19
NOT IN LABOR FORCE....20
OTHER (SPECIFY).....21

MARITAL STATUS CODES

MARRIED.....1
CONSENSUAL UNION...2
DIVORCED.....3
SEPARATED.....4
WIDOW/ER.....5
NEVER MARRIED.....6

Village	HHN	Respondent's name	ID Code	Date	Round

HOUSEHOLD ROSTER

ALL OTHER INDIVIDUALS WHO SPENT LAST NIGHT IN THIS HOUSEHOLD

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	**Name** WRITE THE PERSON'S COMMONLY USED NAME OR NICKNAME, FOLLOWED BY THEIR FORMAL NAME (IF ANY) IN PARENTHESES	**Relation-ship to head** RELATION-SHIP CODE	**Relation-ship to spouse** RELATION-SHIP CODE	**Sex** MALE....1 FEMALE..2	**Is [...] alive?** YES.1 NO..WRITE DATE OF DEATH AND >>NEXT PERSON	**Age**	**Has [...] been living here for more than a month?** YES..1 (>>10) NO...2	**Where does s/he usually live?** LOCATION CODE	**Highest school level attended** SCHOOL LEVEL CODE	**Highest grade achieved** GRADE NUMBER	**Occu-pation** OCCU-PATION CODE	**Marital status** (If 16+) MARITAL STATUS CODE
301												
302												
303												
304												
305												
306												
307												
308												
309												
310												
311												
312												

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION (RURAL) 7
POKROM/NSABAA.....2	EASTERN REGION (URBAN) 8
OBOADAKA/KWAMEKROM..3	ACCRA.....9
KONKONURU.....4	OTHER URBAN.....10
ABURI.....5	OTHER RURAL.....11
NSAWAM.....6	NOT IN GHANA.....12

SCHOOL LEVEL CODES

NONE.....0
PRIMARY.....1
MIDDLE OR JSS.....2
SENIOR SEC, TECH, COMMTY OR TRAINING COLLEGE....3
POST-SEC, NURSING, POLY..4
UNIVERSITY.....5

OCCUPATION CODES

FARMER.....1	MASON.....8	BAKER/COOK.....15
TEACHER.....2	CARPENTER/CARVER.....9	PRIEST.....16
TAXI/TRO-TRO DRIVER....3	HERBALIST.....10	ELDER.....17
TRUCK DRIVER.....4	HAIRDRESSER.....11	STUDENT.....18
ARTISAN.....5	HEALTH WORKER.....12	UNEMPLOYED.....19
CONSTRUCTION WORKER....6	OFFICE WORKER.....13	NOT IN LABOR FORCE....20
FACTORY WORKER.....7	SHOP ATTENDANT/TRADER.14	OTHER (SPECIFY).....21

MARITAL STATUS CODES

MARRIED.....1
CONSENSUAL UNION...2
DIVORCED.....3
SEPARATED.....4
WIDOW/ER.....5
NEVER MARRIED.....6

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

Part A. General plot details

COMPLETE ONE COLUMN FOR EACH PLOT IN OR NEAR THIS VILLAGE, OWNED OR CURRENTLY CONTROLLED BY THE RESPONDENT. USE ADDITIONAL SHEETS IF NECESSARY.

Do you own or currently control any plots of land in or near this village, including fallow land? ☐

YES...LIST PLOTS AT Q1 WITH A BRIEF DESCRIPTION TO AID RECOGNITION, THEN COMPLETE ENTIRE PLOT QUESTIONNAIRE FOR EACH PLOT IN TURN.
NO....(>> END)

		Plot Code	1	2	3	4	5	6
1.	Name or short description of the plot (for identification)							
2.	Is the plot being cultivated or fallow?	CULTIVATED...1 FALLOW.....2 OTHER.....SPECIFY						
3.	Whom does this plot belong to? If self or spouse is a joint owner, code self or spouse respectively.	SELF.....0 SPOUSE...1 (>>PART B) OTHER....RELATIONSHIP CODE (>>PART B)						
4.	How did you obtain the plot?	PURCHASED.....1 INHERITED.....2 MARRIAGE.....3 OTHER.....SPECIFY						
5.	From whom did you obtain the plot?	RELATIONSHIP CODE						
6.	When did you obtain it?	DATE (MM/YY)						
7.	Who is using the land now?	SELF.....0 (>>PART C) SPOUSE....1 OTHER..RELATIONSHIP CODE NO-ONE..999 (>>NEXT PLOT)						

RELATIONSHIP CODES
SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE....15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

PROBE: So, this land is yours but is being used by someone else?

8.	What type of arrangement do you have?	RENTAL..1 OTHER...SPECIFY (>>13)											
9.	What type of rental contract is it?	ABUSA.....1 ABUNU.....2 CASH RENT.....3 OTHER (SPECIFY)..4											
10.	When did the contract begin?	DATE (MM/YY)											
11a.	What fixed rent (if any) do you receive?	VALUE (GHC)											
11b.		FREQUENCY CODE											
12.	How much rent is outstanding (if any)?	VALUE (GHC)											
	Do you receive a share of production as payment for use of the land?		CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)
13a.	YES...GIVE CODE FOR EACH CROP GROWN ON THIS PLOT, THEN RECORD SHARE OF THAT CROP PAID TO RESPONDENT NO....(>> 14)												
13b.													
13c.													
13d.													
13e.													
13f.													
14.	Have you received anything else, in cash or kind, on account of the land?	YES....DESCRIBE NO.....2											
15.	Do you expect to receive anything else, in cash or kind, on account of the land?	YES....DESCRIBE NO.....2 >> PART C											

CROP CODES

CASSAVA.....1	PEPPER.....10
MAIZE.....2	ORANGES.....11
PLANTAIN.....3	BANANA.....12
COCOYAM.....4	AVOCADO.....13
YAM.....5	OIL PALM.....14
PINEAPPLE.....6	COCOA.....15
TOMATO.....7	SUGAR CANE.....16
GARDEN EGG.....8	BEAN.....17
OKRO.....9	GROUNDNUT.....18
	OTHER (SPECIFY).....19

FREQUENCY CODES
DAILY.....1
WEEKLY.....2
FORTNIGHTLY.....3
MONTHLY.....4
QUARTERLY.....5
HALF-YEARLY.....6
YEARLY.....7
OTHER (SPECIFY).....8

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

Part B. Plots not owned by respondent or family

COMPLETE THIS PAGE ONLY FOR THOSE PLOTS LISTED IN PART A WHICH DO NOT BELONG TO THE RESPONDENT.

PROBE: So, you are currently in control of this land but it is owned by someone else?

		Plot Code	1		2		3		4		5		6	
1.	Who owns this plot?	RELATIONSHIP CODE												
2.	What type of arrangement do you have?	RENTAL...1 OTHER....SPECIFY (>> 7)												
3.	What type of rental contract is it?	ABUSA.....1 ABUNU.....2 CASH RENT.....3 OTHER (SPECIFY)..4												
4.	When did the contract begin?	DATE (MM/YY)												
5a.	What fixed rent (if any) do you pay?	GHC												
5b.		FREQUENCY CODE												
6.	How much rent do you owe (if any)?	GHC												
	Do you give a share of production as payment for use of the land?		CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)	CROP CODE	SHARE (%)
7a.	YES...GIVE CODE FOR EACH CROP GROWN ON THIS PLOT, THEN RECORD SHARE OF THAT CROP PAID TO OWNER EACH YEAR NO....(>> 8)													
7b.														
7c.														
7d.														
7e.														
7f.														
8.	Have you given the owner anything else, in cash or kind, on account of the land?	YES....DESCRIBE NO.....2												
9.	Do you expect to give the owner anything else, in cash or kind, on account of the land?	YES....DESCRIBE NO.....2												

CROP CODES

CASSAVA.....1	PEPPER.....10
MAIZE.....2	ORANGES.....11
PLANTAIN.....3	BANANA.....12
COCOYAM.....4	AVOCADO.....13
YAM.....5	OIL PALM.....14
PINEAPPLE.....6	COCOA.....15
TOMATO.....7	SUGAR CANE.....16
GARDEN EGG.....8	BEAN.....17
OKRO.....9	GROUNDNUT.....18
	OTHER (SPECIFY).....19

RELATIONSHIP CODES

SELF.....0	SIBLING.....7	FRIEND NOT IN VILLAGE....15	
SPOUSE.....1	WOFA/UNCLE/AUNT.....8	PRIEST.....16	
CHILD.....2	NIECE/NEPHEW.....9	EXTENSION AGENT.....17	
STEP-CHILD.....3	COUSIN.....10	COOPERATIVE.....18	
PARENT.....4	OTHER RELATIVE.....11	NGO.....19	
GRANDCHILD.....5	VILLAGE HEAD.....12	EXPORTER.....20	
GRANDPARENT.....6	LINEAGE HEAD.....13	TRADER.....21	
	OTHER VILLAGER.....14	OTHER (SPECIFY).....22	

FREQUENCY CODES

DAILY.....1
WEEKLY.....2
FORTNIGHTLY.....3
MONTHLY.....4
QUARTERLY.....5
HALF-YEARLY.....6
YEARLY.....7
OTHER (SPECIFY).....8

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

FOR EACH PLOT, LIST THE IMPROVEMENTS AND CROPS GROWN ON THAT PLOT USING AS MANY LINES AS NEEDED.

Part C. Plot improvements

Have you done anything to improve this plot in the past three years? ☐ NO...(>> PART D)

1. Plot No.	2. Improvement (FALLOW.....1, FERTILIZER...2, PESTICIDE....3, WEEDICIDE....4, OTHER.....5)	3. Date (MM/YY)	4. Who did the work? (RELATIONSHIP CODE)	5. Comments (e.g. type of fertilizer)

CROP CODES

CASSAVA.....1	TOMATO.....7	OIL PALM.....14
MAIZE.....2	GARDEN EGG.....8	COCOA.....15
PLANTAIN.....3	OKRO.....9	SUGAR CANE.....16
COCOYAM.....4	PEPPER.....10	BEAN.....17
YAM.....5	ORANGES.....11	GROUNDNUT.....18
PINEAPPLE.....6	BANANA.....12	OTHER (SPECIFY).....19
	AVOCADO.....13	

Part D. Current plot use

What crops are growing on this plot now, or were growing in the most recent season? ☐ NONE...(>> PART E)

1. Plot No.	2. Crop (CROP CODE)	3. Proportion of plot (PERCENTAGE)	4. Intercropped? (YES...1, NO....2)	5. Who is farming this crop? (RELATIONSHIP CODE)	6. Comments

RELATIONSHIP CODES

SELF.....0	SIBLING.....7	FRIEND NOT IN VILLAGE....15
SPOUSE.....1	WOFA/UNCLE/AUNT.....8	PRIEST.....16
CHILD.....2	NIECE/NEPHEW.....9	EXTENSION AGENT.....17
STEP-CHILD.....3	COUSIN.....10	COOPERATIVE.....18
PARENT.....4	OTHER RELATIVE.....11	NGO.....19
GRANDCHILD.....5	VILLAGE HEAD.....12	EXPORTER.....20
GRANDPARENT.....6	LINEAGE HEAD.....13	TRADER.....21
	OTHER VILLAGER.....14	OTHER (SPECIFY).....22

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

Part E. Past plot usage

FOR EACH PLOT, LIST THE CROPS PREVIOUSLY GROWN ON THAT PLOT USING AS MANY LINES AS NEEDED.

In the past three years, what crops have you (or others) grown on this plot? (Include fallow periods.) ☐

NONE.....(>> NEXT PLOT)

1. Plot No.	2. Crop CROP CODE	3. Dates Start MM/YY	4. Dates End MM/YY	5. Proportion of plot PERCENTAGE	6. Farmer RELATIONSHIP CODE

1. Plot No.	2. Crop CROP CODE	3. Dates Start MM/YY	4. Dates End MM/YY	5. Proportion of plot PERCENTAGE	6. Farmer RELATIONSHIP CODE

CROP CODES
CASSAVA.....1
MAIZE.....2
PLANTAIN.....3
COCOYAM.....4
YAM.....5
PINEAPPLE.....6
TOMATO.....7
GARDEN EGG.....8
OKRO.....9
PEPPER.....10
ORANGES.....11
BANANA.....12
AVOCADO.....13
OIL PALM.....14
COCOA.....15
SUGAR CANE.....16
BEAN.....17
GROUNDNUT.....18
OTHER (SPECIFY).....19

RELATIONSHIP CODES
SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6

SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14

FRIEND NOT IN VILLAGE...15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

Part F. Plot inputs (labour)

In the past two months, have you worked on this plot, or asked anyone else to work on this plot? ☐ NO WORK.....(>>NEXT PLOT)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Plot No.	Work done DESCRIPTION	Crop involved CROP CODE (LEAVE BLANK IF WORK NOT CROP-SPECIFIC)	How many days did you spend on it?	Did anyone else help with the work (including relatives)? YES...1 NO....2 (>>NEXT TASK)	How many other people?	For how many days on average did each person help?	Were they paid? YES...1 NO....2 (>> 10)	How much did you pay in cash for their labour? GHC	What was the total value of meals provided for them? GHC	Value of any other cash or in-kind payment (including own labour) GHC

CROP CODES

CASSAVA.....1	TOMATO.....7	OIL PALM.....14
MAIZE.....2	GARDEN EGG.....8	COCOA.....15
PLANTAIN.....3	OKRO.....9	SUGAR CANE.....16
COCOYAM.....4	PEPPER.....10	BEAN.....17
YAM.....5	ORANGES.....11	GROUNDNUT.....18
PINEAPPLE.....6	BANANA.....12	OTHER (SPECIFY).....19
	AVOCADO.....13	

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

Part G. Plot inputs (non-labour)

In the past two months, what other expenses have you incurred in growing and selling the crops on this plot? ☐
Include pesticide, fertilizer, supplies consumed, and payments to contractors. Do not include land rent or purchase costs.

1.	2.	3.		4.	5.	6.	7.	8.
Plot No.	Crop involved CROP CODE (LEAVE BLANK IF WORK NOT CROP-SPECIFIC)	What was the input?		How much/many?		How much did it cost/was it worth?	How did you obtain it? PAID CASH.....1 EXCHANGED FOR GOODS/SERVICES..2 GIFT.....3 FROM OWN FARM.....4	From where/whom did you obtain it? RELATIONSHIP CODE
		INPUT CODE	DESCRIPTION	UNIT CODE	QUANTITY	GHC		

INPUT CODES
INSECTICIDE/PESTICIDE....1
BIOLOGICAL CONTROL.....2
HERBICIDE.....3
FUNGICIDE.....4
FERTILIZER.....5
OTHER CHEMICAL.....6
SPRAYING COSTS.....7
TRACTOR PLOWING.....8
TRANSPORT COSTS.....9
OTHER COMMERCIAL INPUT..10
PROTECTIVE CLOTHING....11
BAGS, DRUMS, CONTAINERS.12
SUCKERS.....13
SEEDS.....14
SEEDLINGS.....15
STICKS.....16

RELATIONSHIP CODES
SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE...15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

CROP CODES
CASSAVA.....1
MAIZE.....2
PLANTAIN.....3
COCOYAM.....4
YAM.....5
PINEAPPLE.....6
TOMATO.....7
GARDEN EGG.....8
OKRO.....9
PEPPER.....10
ORANGES.....11
BANANA.....12
AVOCADO.....13
OIL PALM.....14
COCOA.....15
SUGAR CANE.....16
BEAN.....17
GROUNDNUT.....18
OTHER (SPECIFY)....19

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT QUESTIONNAIRE

Part H. Plot rights

		Plot Code	1		2		3		4		5		6	
			CROP CODE	REL'SHIP CODE	CROP CODE	REL'SHIP CODE	CROP CODE	REL'SHIP CODE	CROP CODE	REL'SHIP CODE	CROP CODE	REL'SHIP CODE	CROP CODE	REL'SHIP CODE
1a.	Who decides when to harvest the crops on this plot?													
1b.														
1c.	PUT CROP CODE IN FIRST BOX AND RELATIONSHIP CODE IN SECOND BOX. USE ONE LINE FOR EACH CROP.													
1d.														
2a.	Who decides whether and when to sell the crops?													
2b.														
2c.	PUT CROP CODE IN FIRST BOX AND RELATIONSHIP CODE IN SECOND BOX. USE ONE LINE FOR EACH CROP.													
2d.														

IF THE PLOT IS RENTED UNDER SHORT TERM CONTRACT >>NEXT PLOT, OTHERWISE CONTINUE

3.	Who decides who will inherit this plot?	RELATIONSHIP CODE						
4.	Do you know now who will inherit the plot?	RELATIONSHIP CODE						
5.	Who can rent out the plot for a season?	RELATIONSHIP CODE						
6.	Who can lend the plot to someone else?	RELATIONSHIP CODE						
7.	Who can use the plot as collateral?	RELATIONSHIP CODE						
8.	Who can sell the plot?	RELATIONSHIP CODE						
9.	Who can register the plot?	RELATIONSHIP CODE						

Part I. Soil Fertility Ranking

Please rank your plots in order of fertility (from most to least fertile)

1.	Plot ranking	1 = MOST FERTILE						

RELATIONSHIP CODES

SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE....15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22
NOT APPLICABLE.....98

Village	HHN	Respondent's name	ID Code	Date	Round

SALE OF FARM OUTPUT

Part A. Sale of output from own farms

In the past two months, have you sold, or promised to sell, anything grown on plots you control? *Note: Do not include sales of produce from spouse's plots.* ☐

YES...COMPLETE ONE COLUMN FOR EACH TYPE OF CROP SOLD. USE ADDITIONAL SHEETS IF NECESSARY.
NO....(>> PART B)

			1	2	3	4	5	6
1.	Crop	CROP CODE						
2.	On which plot(s) was this crop grown?	PLOT CODE(S)						
3.	When was it harvested?	MM/YY						
4.	Who paid/will pay for harvesting this crop?	RELATIONSHIP CODE						
5.	How much of the crop did you sell?	NUMBER OF UNITS						
6.		UNIT CODE						
7.	How much money was it sold for?	IF PAYMENT IN KIND, ESTIMATE VALUE IN GHC						
8.	Was the crop sold at market?	YES...1 NO....2 (>> 12)						
9.	Did you sell it yourself?	YES...1 (>>NEXT CROP) NO....2						
10.	Who sold it?	RELATIONSHIP CODE						
11.	How much of the money will **you** receive?	(>>NEXT CROP)						
12.	To whom did you sell the crop?	RELATIONSHIP CODE						
13.	Has the buyer received all the crops?	YES...1 (>>16) NO....2						
14.	How much remains to be given?	NUMBER OF UNITS						
15.	When will you give it to the buyer?	MM/YY						
16.	Have you received full payment?	YES...1 (>>NEXT CROP) NO....2						
17.	How much remains to be paid?	GHC						
18.	When do you expect to be paid?	MM/YY						

CROP CODES
CASSAVA.....1
MAIZE.....2
PLANTAIN.....3
COCOYAM.....4
YAM.....5
PINEAPPLE.....6
TOMATO.....7
GARDEN EGG.....8
OKRO.....9
PEPPER.....10
ORANGES.....11
BANANA.....12
AVOCADO.....13
OIL PALM.....14
COCOA.....15
SUGAR CANE.....16
BEAN.....17
GROUNDNUT.....18
OTHER (SPECIFY)....19

RELATIONSHIP CODES
SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE...15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

SALE OF FARM OUTPUT

Part B. Sale of output from spouse's plots

In the past two months, have you sold, or promised to sell, anything grown on plots your spouse controls? ☐

YES...COMPLETE ONE COLUMN FOR EACH TYPE OF CROP SOLD. USE ADDITIONAL SHEETS IF NECESSARY.
NO....(>> END)

			1	2	3	4	5	6
1.	Crop	CROP CODE						
2.	ID of spouse who grew crop (if multiple spouses)							
3.	When was it harvested?	MM/YY						
4.	Who paid/will pay for harvesting this crop?	RELATIONSHIP CODE						
5.	How much of the crop did you sell?	NUMBER OF UNITS						
6.		UNIT CODE						
7.	How much money was it sold for?	IF PAYMENT IN KIND, ESTIMATE VALUE IN GHC						
8.	Was the crop sold at market?	YES...1 NO....2 (>> 12)						
9.	Did you sell it yourself?	YES...1 (>>NEXT CROP) NO....2						
10.	Who sold it?	RELATIONSHIP CODE						
11.	How much of the money will you receive?	>>NEXT CROP						
12.	To whom did you sell the crop?	RELATIONSHIP CODE						
13.	Has the buyer received all the crops?	YES...1 (>>16) NO....2						
14.	How much remains to be given?	NUMBER OF UNITS						
15.	When will you give it to the buyer?	MM/YY						
16.	Have you received full payment?	YES...1 (>>NEXT CROP) NO....2						
17.	How much remains to be paid?	GHC						
18.	When do you expect to be paid?	MM/YY						

CROP CODES
CASSAVA.....1
MAIZE.....2
PLANTAIN.....3
COCOYAM.....4
YAM.....5
PINEAPPLE.....6
TOMATO.....7
GARDEN EGG.....8
OKRO.....9
PEPPER.....10
ORANGES.....11
BANANA.....12
AVOCADO.....13
OIL PALM.....14
COCOA.....15
SUGAR CANE.....16
BEAN.....17
GROUNDNUT.....18
OTHER (SPECIFY)....19

RELATIONSHIP CODES
SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE...15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

OTHER INCOME

Part A: Non-farm business income

Have you conducted any business other than farming in the past two months? ☐

YES...COMPLETE ONE COLUMN FOR EACH NON-FARM BUSINESS.
USE ADDITIONAL SHEETS IF NECESSARY.
NO....(>> PART B)

		1	2	3	4
1.	Description of business				
2.	Initial stock of raw materials and goods for sale (replacement value) GHC				
3.	Raw materials/goods purchased GHC				
4.	Raw materials/goods obtained from own farm GHC				

		Days	Value of labour per day	Days	Value of labour per day	Days	Value of labour per day	Days	Value of labour per day
5.	Own labour								
6.	Spouse's labour								
7.	Other unpaid labour								

8.	Wages GHC				
9.	Payments for other services GHC				
10.	Transport, fuel costs GHC				
11.	Building costs, equipment purchase GHC				
12.	Equipment/building repairs, rent paid GHC				
13.	Taxes and fees paid GHC				
14.	Other expenses (INCLUDE DESCRIPTION) GHC				
15.	Sales receipts GHC				
16.	Own and household consumption of business output GHC				
17.	Other payments, gifts and donations to the business GHC				
18.	Final stock of raw materials and goods for sale GHC				

Village	HHN	Respondent's name	ID Code	Date	Round

OTHER INCOME

Part B: Labour income

Have you done any work for other people or organisations in the past two months? ☐

YES...COMPLETE ONE COLUMN FOR EACH JOB WORKED IN PAST TWO MONTHS.
USE ADDITIONAL SHEETS IF NECESSARY.
NO....(>> PART C)

			1	2	3	4
1.	Occupation or type of work	OCCUPATION CODE AND DESCRIPTION IF APPLICABLE				
2.	For whom did you work?	EMPLOYER CODE				
3.	Is the employment temporary or permanent?	TEMPORARY...1 PERMANENT...2				
4.	How many days did you work in the past two months?	DAYS				
5.	How much cash were you paid for the work?	GHC				
6.	Did you receive any goods in kind for the work?	DESCRIPTION				
7.		VALUE (GHC)				
8.	Have you been paid in full?	YES...1 (>>NEXT JOB) NO....2				
9.	Value of any remaining payment expected	GHC				

OCCUPATION CODES

FARMER.....1	MASON.....8	BAKER/COOK.....15
TEACHER.....2	CARPENTER/CARVER.....9	PRIEST.....16
TAXI/TRO-TRO DRIVER....3	HERBALIST.....10	ELDER.....17
TRUCK DRIVER.....4	HAIRDRESSER.....11	STUDENT.....18
ARTISAN.....5	HEALTH WORKER.....12	UNEMPLOYED.....19
CONSTRUCTION WORKER....6	OFFICE WORKER.....13	NOT IN LABOR FORCE....20

EMPLOYER CODES

SPOUSE.....1	FRIEND IN VILLAGE.....6	SCHOOL.....12
CHILD.....2	FRIEND ELSEWHERE.....7	CHURCH.....13
PARENT.....3	OTHER VILLAGER.....8	NGO OR NONPROFIT.....14
OTH HH MEMBER.....4	COMPANY <5 WORKERS.....9	GOVERNMENT.....15
OTH RELATIVE.....5	COMPANY 5-10 WORKERS..10	OTHER (SPECIFY).....16
	COMPANY >10 WORKERS...11	

Village	HHN	Respondent's name	ID Code	Date	Round

OTHER INCOME

Part C. Other farm income

Have you earned any income from farms outside this village in the past two months?

YES...LIST INCOME FOR EACH FARM OUTSIDE VILLAGE.
NO....(>> PART D)

	1. Location LOCATION CODE	2. Main crop CROP CODE	3. Revenue GHC	4. Expenses (excluding investment) GHC	5. Net Income GHC
a.					
b.					
c.					
d.					
e.					
f.					

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION (RURAL) 7
POKROM/NSABAA.....2	EASTERN REGION (URBAN) 8
OBOADAKA/KWAMEKROM.....3	ACCRA.....9
KONKONURU.....4	OTHER URBAN.....10
ABURI.....5	OTHER RURAL.....11
NSAWAM.....6	NOT IN GHANA.....12

CROP CODES

CASSAVA.....1	PEPPER.....10
MAIZE.....2	ORANGES.....11
PLANTAIN.....3	BANANA.....12
COCOYAM.....4	AVOCADO.....13
YAM.....5	OIL PALM.....14
PINEAPPLE.....6	COCOA.....15
TOMATO.....7	SUGAR CANE.....16
GARDEN EGG.....8	BEAN.....17
OKRO.....9	GROUNDNUT.....18
	OTHER (SPECIFY).....19

Part D. Other income

Have you received income from any other source in the past two months? For example, a pension, investment dividends, prize winnings or sales of land?

YES...LIST OTHER INCOME AND PROBE FOR PRIZE WINNINGS
NO....(>> PART E)

	1. Description	2. Amount
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		

Part E. Spouse's other income

Aside from sales of farm produce, has your spouse received any other income in the past two months? For example, from non-farm business, paid work, farms outside town, pensions or prize winnings?

YES...LIST ALL SPOUSE'S INCOME SOURCES AND PROBE FOR PRIZE WINNINGS
NO....(>> END)

	1. Spouse ID	2. Description (Source)	3. Net Income
a.			
b.			
c.			
d.			
e.			
f.			
g.			
h.			
i.			

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION

Part A. Purchased food

I would like to know about the food your household has bought in the past month.

	1. Has anyone in your household bought any […] in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY FOODS CONSUMED. THEN RETURN TO THE FIRST ITEM AND COMPLETE Q3-13 FOR THOSE ITEMS CONSUMED.	2.	3. How much [...] has your household bought over the past month? QUANTITY	4. UNIT CODE	5. How much in total was spent on [...]? GHC	6. How many times have you bought [...] in the past month? IF NEVER WRITE ZERO AND >> 10	7. How much did you buy each time, on average? QUANTITY	8. UNIT CODE	9. How much did you pay for it last time you bought it? GHC	10. How many times has your spouse(s) bought [...] in the past month? IF NEVER WRITE ZERO AND >> NEXT ITEM	11. How much did your spouse(s) buy each time, on average? QUANTITY	12. UNIT CODE	13. How much did they pay for it last time they bought it? GHC
a.	Maize												
b.	Corn dough												
c.	Rice												
d.	Bread												
e.	Macaroni or flour												
f.	Cassava												
g.	Garri, kokonte or other cassava												
h.	Yams												
i.	Cocoyam												
j.	Plantain												
k.	Potato, sweet potato, millet, guinea corn or sorghum												
l.	Oil palm fruit												
m.	Groundnuts												
n.	Seafood												
o.	Chicken												

UNIT CODES

NUMBER.....1	MAXIBAG.....6	LOAVES.....11	SMALL BASKETS.....16	MARGARINE TIN (LARGE)...21
GRAMS.....2	LITRES.....7	BUNDLES.....12	LARGE BASKETS.....17	HEADLOADS.....22
KILOGRAMS.....3	ROPES.....8	BEER BOTTLES.....13	TOMATO TINS (SMALL).....18	SACHETS/PACKETS.....23
POUNDS.....4	BUNCHES.....9	OLONKA/AMERICAN TINS....14	TOMATO TINS (LARGE).....19	TUBERS.....24
MINIBAG.....5	BALLS.....10	BUCKETS.....15	MARGARINE TIN (SMALL)...20	STICKS.....25
				OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION: FOOD PURCHASED

Part A. Purchased food (continued)

	1. Has anyone in your household bought any […] in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY FOODS CONSUMED. THEN RETURN TO THE FIRST ITEM AND COMPLETE Q3-13 FOR THOSE ITEMS CONSUMED.	2.	3. How much [...] has your household bought over the past month? QUANTITY	4. UNIT CODE	5. How much in total was spent on [...]? GHC	6. How many times have you bought [...] in the past month? IF NEVER WRITE ZERO AND >> 10	7. How much did you buy each time, on average? QUANTITY	8. UNIT CODE	9. How much did you pay for it last time you bought it? GHC	10. How many times has your spouse(s) bought [...] in the past month? IF NEVER WRITE ZERO AND >> NEXT ITEM	11. How much did your spouse(s) buy each time, on average? QUANTITY	12. UNIT CODE	13. How much did they pay for it last time they bought it? GHC
p.	Other poultry (pigeon, duck,…)												
q.	Beef												
r.	Goat or sheep												
s.	Bushmeat												
t.	Eggs												
u.	Palm oil												
v.	Margarine, butter												
w.	Pineapples												
x.	Other fruit												
y.	Sugar cane, toffee, honey												
z.	Milo, tea, coffee												
aa.	Milk, milk powder, baby food												
bb.	Non-alcoholic beverages												
cc.	Alcoholic beverages												
dd.	Salt												

UNIT CODES

NUMBER.....1	MAXIBAG.....6	LOAVES.....11	SMALL BASKETS.....16	MARGARINE TIN (LARGE)...21
GRAMS.....2	LITRES.....7	BUNDLES.....12	LARGE BASKETS.....17	HEADLOADS.....22
KILOGRAMS.....3	ROPES.....8	BEER BOTTLES.....13	TOMATO TINS (SMALL).....18	SACHETS/PACKETS.....23
POUNDS.....4	BUNCHES.....9	OLONKA/AMERICAN TINS....14	TOMATO TINS (LARGE).....19	TUBERS.....24
MINIBAG.....5	BALLS.....10	BUCKETS.....15	MARGARINE TIN (SMALL)...20	STICKS.....25
				OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION: FOOD PURCHASED

Part A. Purchased food (continued)

	1. Has anyone in your household bought any […] in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY FOODS CONSUMED. THEN RETURN TO THE FIRST ITEM AND COMPLETE Q3-13 FOR THOSE ITEMS CONSUMED.	2.	3. How much [...] has your household bought over the past month? QUANTITY	4. UNIT CODE	5. How much in total was spent on [...]? GHC	6. How many times have you bought [...] in the past month? IF NEVER WRITE ZERO AND >> 10	7. How much did you buy each time, on average? QUANTITY	8. UNIT CODE	9. How much did you pay for it last time you bought it? GHC	10. How many times has your spouse(s) bought [...] in the past month? IF NEVER WRITE ZERO AND >> NEXT ITEM	11. How much did your spouse(s) buy each time, on average? QUANTITY	12. UNIT CODE	13. How much did they pay for it last time they bought it? GHC
ee.	Maggi cubes, tomato paste												
ff.	Tomatoes												
gg.	Onions												
hh.	Garden egg, okro												
ii.	Beans, peas												
jj.	Pepper												
kk.	Kontomle												
ll.	Other vegetables												
mm.	Fufu, kenkey, banku												
nn.	Other prepared foods												
oo.	Meals away from home (e.g. chop bars)												
pp.	Other:												
qq.	Other:												
rr.	Other:												
ss.	Other:												

UNIT CODES

NUMBER.....1	MAXIBAG.....6	LOAVES.....11	SMALL BASKETS.....16	MARGARINE TIN (LARGE)...21
GRAMS.....2	LITRES.....7	BUNDLES.....12	LARGE BASKETS.....17	HEADLOADS.....22
KILOGRAMS.....3	ROPES.....8	BEER BOTTLES.....13	TOMATO TINS (SMALL).....18	SACHETS/PACKETS.....23
POUNDS.....4	BUNCHES.....9	OLONKA/AMERICAN TINS....14	TOMATO TINS (LARGE).....19	TUBERS.....24
MINIBAG.....5	BALLS.....10	BUCKETS.....15	MARGARINE TIN (SMALL)...20	STICKS.....25
				OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION

Part B. Food consumed from household farms

Now I would like to know how much food your household has consumed from your household's farms.

	1. Has anyone consumed any […] from your household's farms in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY FOODS CONSUMED. THEN RETURN TO THE FIRST ITEM AND COMPLETE Q3-11 FOR THOSE ITEMS CONSUMED.	2.	3. How much [...] has your household consumed from its farms over the past month? QUANTITY	4. UNIT CODE	5. How much would this be worth if it were sold? GHC	6. How much of the [...] consumed came from your farms? QUANTITY	7. UNIT CODE	8. How much would this be worth if it were sold? GHC	9. How much of the [...] consumed came from your spouses' farms? QUANTITY	10. UNIT CODE	11. How much would this be worth if it were sold? GHC
a.	Maize										
b.	Cassava										
c.	Garri, kokonte or other cassava										
d.	Yams										
e.	Cocoyam										
f.	Plantain										
g.	Potato, sweet potato										
h.	Oil palm fruit										
i.	Groundnuts										
j.	Seafood										
k.	Chicken										
l.	Other poultry (pigeon, duck,…)										
m.	Goat or sheep										
n.	Bushmeat										
o.	Eggs										

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION

Part B. Food consumed from household farms (continued)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
	Has anyone consumed any […] from your household's farms in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY FOODS CONSUMED. THEN RETURN TO THE FIRST ITEM AND COMPLETE Q3-11 FOR THOSE ITEMS CONSUMED.		**How much [...] has your household consumed from its farms over the past month?** QUANTITY	UNIT CODE	**How much would this be worth if it were sold?** GHC	**How much of the [...] consumed came from your farms?** QUANTITY	UNIT CODE	**How much would this be worth if it were sold?** GHC	**How much of the [...] consumed came from your spouses' farms?** QUANTITY	UNIT CODE	**How much would this be worth if it were sold?** GHC
p.	Palm oil										
q.	Other oil										
r.	Pineapples										
s.	Other fruit										
t.	Sugar cane, honey										
u.	Palm wine, akpeteshie										
v.	Other drinks										
w.	Tomatoes										
x.	Onions										
y.	Garden egg, okro										
z.	Beans, peas										
aa.	Pepper										
bb.	Kontomle										
cc.	Other vegetables										
dd.	Other foods										

UNIT CODES

NUMBER	1
GRAMS	2
KILOGRAMS	3
POUNDS	4
MINIBAG	5
MAXIBAG	6
LITRES	7
ROPES	8
BUNCHES	9
BALLS	10
LOAVES	11
BUNDLES	12
BEER BOTTLES	13
OLONKA/AMERICAN TINS	14
BUCKETS	15
SMALL BASKETS	16
LARGE BASKETS	17
TOMATO TINS (SMALL)	18
TOMATO TINS (LARGE)	19
MARGARINE TIN (SMALL)	20
MARGARINE TIN (LARGE)	21
HEADLOADS	22
SACHETS/PACKETS	23
TUBERS	24
STICKS	25
OTHER (SPECIFY)	26

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION

Part C. Other purchased items

Now I would like to ask about other things your household has bought in the past month.

	1. **Has anyone in your household spent money on […] in the past month?** READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY ITEMS PURCHASED. THEN RETURN TO THE FIRST LINE AND COMPLETE Q3-8 FOR THOSE ITEMS PURCHASED.	2.	3. **How many [...] did your household purchase/pay for?** IF NONE WRITE ZERO AND >> NEXT ITEM	4. **How much in total did your household spend on [...] in the past month?** GHC	5. **How many [...] did you purchase/pay for?** IF NONE WRITE ZERO AND >> 7	6. **How much did you personally spend on [...] in the past month?** GHC	7. **How many [...] did your spouse(s) purchase/pay for?** IF NONE WRITE ZERO AND >> NEXT ITEM	8. **How much did your spouse(s) spend on [...] in the past month?** GHC
a.	School fees							
b.	Other school expenses							
c.	Medicine (purchased by your household)							
d.	Other medical expenses (including NHIS premiums)							
e.	Adult shoes							
f.	Children's shoes							
g.	Cloth							
h.	Adult clothes							
i.	Children's clothes							
j.	Material for adult clothes							
k.	Material for children's clothes							
l.	Soap							
m.	Personal care products (pomade, combs, shampoo,…)							
n.	Brooms, home maintenance, cleaning products							
o.	Home repairs, painting							

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION

Part C. Other purchased items (continued)

	1. Has anyone in your household spent money on […] in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY ITEMS PURCHASED. THEN RETURN TO THE FIRST LINE AND COMPLETE Q3-8 FOR THOSE ITEMS PURCHASED.	2.	3. How many [...] did your household purchase/pay for? IF NONE WRITE ZERO AND >> NEXT ITEM	4. How much in total did your household spend on [...] in the past month? GHC	5. How many [...] did you purchase/pay for? IF NONE WRITE ZERO AND >> 7	6. How much did you personally spend on [...] in the past month? GHC	7. How many [...] did your spouse(s) purchase/pay for? IF NONE WRITE ZERO AND >> NEXT ITEM	8. How much did your spouse(s) spend on [...] in the past month? GHC
p.	Public transport							
q.	Petrol, motor oil							
r.	Repairs, other vehicle expenses							
s.	Newspapers, books, stationery							
t.	Charcoal, firewood							
u.	Matches, candles							
v.	Other fuel for cooking, light							
w.	Stove, coal pot							
x.	Kitchen equipment (pots, pans)							
y.	Lanterns							
z.	Electricity and water							
aa.	Telephone bills, phone credit							
bb.	Furniture							
cc.	Sheets, towels							
dd.	Rent							

Village	HHN	Respondent's name	ID Code	Date	Round

CONSUMPTION

Part C. Other purchased items (continued)

	1. Has anyone in your household spent money on […] in the past month? READ OUT THE LIST AND PLACE A CROSS IN THE BOX FOR ANY ITEMS PURCHASED. THEN RETURN TO THE FIRST LINE AND COMPLETE Q3-8 FOR THOSE ITEMS PURCHASED.	2.	3. How many [...] did your household purchase/pay for? IF NONE WRITE ZERO AND >> NEXT ITEM	4. How much in total did your household spend on [...] in the past month? GHC	5. How many [...] did you purchase/pay for? IF NONE WRITE ZERO AND >> 7	6. How much did you personally spend on [...] in the past month? GHC	7. How many [...] did your spouse(s) purchase/pay for? IF NONE WRITE ZERO AND >> NEXT ITEM	8. How much did your spouse(s) spend on [...] in the past month? GHC
ee.	Hairdressing, haircuts							
ff.	Domestic servants							
gg.	Jewelry, watches, camera							
hh.	Entertainment (cinema, sports, tapes, toys)							
ii.	Taxes							
jj.	Weddings, dowries							
kk.	Funerals							
ll.	Lottery tickets							
mm.	Cigarettes, tobacco, cola							
nn.	Sewing machine							
oo.	Radio, tape player							
pp.	Other major appliance							
qq.	Bicycle							
rr.	Car, motorbike, other vehicle							
ss.	Other (specify)							

Village	HHN	Respondent's name	ID Code	Date	Round

ASSETS

Part A. Food and farm output

What stores of food or farm output does your household have right now?

	1. Do you have any… YES...CHECK BOX AND ANSWER Q3-8 NO....>> NEXT ITEM	2.	3. How is the […] treated? TREATMENT CODE	4. How much / how many [...] do you have? QUANTITY	5. UNIT CODE	6. How much money could you sell the [...] for? GHC	7. When did you purchase, harvest or receive it? DATE (MM/YY) (if multiple, give latest)	8. Who owns the [...]? SELF.....1 SPOUSE.....2 OTHER HH MEMBER...3 SOMEBODY OUTSIDE HOUSEHOLD.....4
a.	Cassava							
b.	Maize							
c.	Cocoyam							
d.	Yam							
e.	Pineapple							
f.	Tomato							
g.	Pepper							
h.	Bean							
i.	Plantain							

Any others I have not mentioned?

j.								
k.								
l.								
m.								
n.								
o.								

TREATMENT CODES
FRESH.....0
DRIED.....1
SMOKED.....2
DUSBAN.....3
OTHER (SPECIFY).....4

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

ASSETS

Part B. Stocks of seeds and planting materials

What stocks of seeds or planting materials do you have?

	1. Do you have any seeds or planting materials for… YES...CHECK BOX AND ANSWER Q3-7 NO....>> NEXT ITEM	2.	3. How much / how many [...] do you have? QUANTITY	4. UNIT CODE	5. How much money could you sell the [...] for? GHC	6. When did you purchase, harvest or receive this item? DATE (MM/YY) (If multiple dates, give latest)	7. Who owns the [...]? SELF.....1 SPOUSE.....2 OTHER HH MEMBER...3 SOMEBODY OUTSIDE HOUSEHOLD.....4
a.	Cassava						
b.	Maize						
c.	Cocoyam						
d.	Yam						
e.	Pineapple						
f.	Tomato						
g.	Pepper						
h.	Bean						
i.	Plantain						

Any others I have not mentioned?

j.							
k.							
l.							
m.							
n.							
o.							

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

ASSETS

Part C. Farm equipment

What equipment does your household own which is used for farming?

	1. Do you have... YES...CHECK BOX AND ANSWER Q3-7 NO....>> NEXT ITEM	2.	3. How much / how many [...] do you have? QUANTITY	4. UNIT CODE	5. How much money would the [...] be worth now? GHC	6. When was the item received/purchased? DATE (MM/YY) (If multiple, give latest)	7. Who owns the [...]? SELF.....1 SPOUSE.....2 OTHER HH MEMBER...3 SOMEBODY OUTSIDE HOUSEHOLD.....4
a.	Cutlass						
b.	Sprayer						
c.	Knapsack						
d.	Hoe						
e.	Chemicals						
f.	Fertilizer						
g.	Mattock						
h.	Rake						
i.	Shovel						
j.	Chain saw						
k.	Gun						
l.	Pipe						
m.	Barrel / drum						
n.	Mist blower						
o.	Other tools						

Does the household have any other items used for farming?

p.							
q.							
r.							

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

ASSETS

Part D. Other durable assets

Does your household own any of the following items?

	1. Does anyone have… YES...CHECK BOX AND ANSWER Q3-6 NO....>> NEXT ITEM	2.	3. How many? QUANTITY	4. How much money would the […] be worth now? GHC	5. When was the […] purchased / received? DATE (MM/YY) (If multiple, give latest)	6. Whom does the […] belong to? SELF.....1 SPOUSE.....2 OTHER HH MEMBER....3 SOMEBODY OUTSIDE HOUSEHOLD.....4
a.	Cooking utensils					
b.	Sewing machine					
c.	Car					
d.	Truck					
e.	Bicycle					
f.	Radio / tape recorder					
g.	Television					
h.	Telephone					
i.	Refrigerator					
j.	Grinding mill					
k.	Comb / scissors					
l.	Hammer					
m.	Pot / bowl					
n.	Fan					
o.	Other tools					

Does the household have any other items used for business activities?

p.						
q.						
r.						

Village	HHN	Respondent's name	ID Code	Date	Round

ASSETS

Part E. Livestock

Please tell me about the animals owned by your household.

	1. Does anyone in your household own… YES...ANSWER Q2-8 NO....>> NEXT ITEM	2. Type	3. How many? Male	4. Female	5. Total	6. Whom do they belong to? SELF.....1 SPOUSE.....2 OTHER HH MEMBER...3 SOMEBODY OUTSIDE HOUSEHOLD.....4	7. When were the animals purchased / received? DATE (MM/YY) (If multiple, give latest)	8. In total, how much money could they be sold for today? GHC
a.	Goats	Adults						
b.		Kids						
c.	Sheep	Adults						
d.		Lambs						
e.	Pigs	Adults						
f.		Piglets						
g.	Chickens	Layers						
h.		Broilers						
i.		Local						
j.	Guinea fowl							
k.	Other poultry:							
l.	Rabbits							

Any other animals (e.g. cattle, horses, grasscutters, fish)?

m.								
n.								
o.								

Village	HHN	Respondent's name	ID Code	Date	Round

ASSETS

Part F. Other tradeable goods

Does anyone in your household have any tradeable goods or merchandise, other than stores of food or farm output mentioned earlier?

	1	2	3	4	5	6
	If yes, what are they?	**How much or how many […]?**		**How much money could they be sold for?**	**When was the […] purchased / received?**	**Who owns them?** SELF.....1 SPOUSE.....2 OTHER HH MEMBER...3 SOMEBODY OUTSIDE HOUSEHOLD.....4
	GIVE CROP CODE OR DESCRIPTION	QUANTITY	UNIT CODE	GHC	DATE (If multiple, give latest)	
a.						
b.						
c.						
d.						
e.						
f.						
g.						
h.						
i.						
j.						
k.						
l.						
m.						
n.						
o.						

CROP CODES
CASSAVA.....1
MAIZE.....2
PLANTAIN.....3
COCOYAM.....4
YAM.....5
PINEAPPLE.....6
TOMATO.....7
GARDEN EGG.....8
OKRO.....9
PEPPER.....10
ORANGES.....11
BANANA.....12
AVOCADO.....13
OIL PALM.....14
COCOA.....15
SUGAR CANE.....16
BEAN.....17
GROUNDNUT.....18
OTHER (SPECIFY).....19

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

Village	HHN	Respondent's name	ID Code	Date	Round

FINANCIAL ASSETS

Now I would like to ask about your financial assets. Please remember this survey is confidential. You will not be identified in any documents we publish. Your personal information will not be reported to anyone.

Part A. Susu funds

Are you a member of a susu or esusu group? ☐

IF NO, >> PART B

Please tell me about each group you belong to.

	1. What type of group is it? (SUSU.....1, ESUSU....2)	2. How often do you deposit? (FREQUENCY CODE)	3. Deposit amount (GHC)	4. What is your balance? (GHC)	5. Date you will receive the funds (if known) (DD/MM/YY)	6. What is your relationship to the collector? (RELATIONSHIP CODE)
a.						
b.						
c.						

Part B. Funds in other savings/insurance cooperatives

Are you a member of a savings or insurance cooperative other than susu or esusu, such as a burial society? ☐

IF NO, >> PART C

Please tell me about each group you belong to.

	1. Description of group	2. Contribution amount (GHC)	3. Frequency of contribution (FREQUENCY CODE)	4. When did you last receive money from the group? (DATE (MM/YY))	5. Amount received (GHC)	6. Do/did you have to repay? (NO.....1, YES, WITH INTEREST.....2, YES, WITHOUT INTEREST.....3, OTHER...SPECIFY)
a.						
b.						
c.						

RELATIONSHIP CODES

SELF.....0	WOFA.....7	NGO.....14	
SPOUSE.....1	UNCLE/AUNT.....8	EXPORTER.....15	
CHILD.....2	COUSIN.....9	VILLAGE HEAD.....16	
PARENT.....3	FRIEND.....10	LINEAGE HEAD.....17	
GRANDCHILD.....4	EXTENSION AGENT....11	PRIEST.....18	
GRANDPARENT.....5	MARKET.....12	TRADER.....19	
SIBLING.....6	COOPERATIVE.....13	OTHER (SPECIFY)....20	

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION (RURAL) 7		
POKROM/NSABAA.....2	EASTERN REGION (URBAN) 8		
OBOADAKA/KWAMEKROM.....3	ACCRA.....9		
KONKONURU.....4	OTHER URBAN.....10		
ABURI.....5	OTHER RURAL.....11		
NSAWAM.....6	NOT IN GHANA.....12		

Part C. Money held by respondent

Are you holding money for anyone? ☐

IF NO, >> PART D

Please tell me about each amount. DO NOT INCLUDE LOANS AT THIS QUESTION

	1. For whom are you holding money? (RELATIONSHIP CODE)	2. Where do they live? (LOCATION CODE)	3. How much money? (GHC)	4. When did you receive the money? (DATE (MM/YY))
a.				
b.				
c.				

Part D. Money held by others

Is anyone holding money for you? ☐

IF NO, >> END

Please tell me about each amount. DO NOT INCLUDE LOANS AT THIS QUESTION

	1. Who is holding your money? (RELATIONSHIP CODE)	2. Where do they live? (LOCATION CODE)	3. How much money? (GHC)	4. When did you give them the money? (DATE (MM/YY))
a.				
b.				
c.				

FREQUENCY CODES

DAILY.....1	
WEEKLY.....2	
FORTNIGHTLY.....3	
MONTHLY.....4	
QUARTERLY.....5	
HALF-YEARLY.....6	
YEARLY.....7	
OTHER (SPECIFY).....8	

Village	HHN	Respondent's name	ID Code	Date	Round

FINANCIAL ASSETS

Part E. Other financial assets

1. Do you have a bank account? YES....1 NO.....2 (>> 3)

2. What is the balance today? GHC

3. Do you own any stocks, bonds, or other financial assets?
   YES....1
   NO.....2 (>> 5)

4. How much are they worth today?

5. Do you currently receive a pension, or expect to soon?
   YES....1
   NO.....2 (>> 9)

6. How much is the pension (per month)?

7. Who pays (or will pay) you the pension? EMPLOYER CODE

8. When did/will the pension begin? DATE (MM/YY)

What value (if any) of the following items do you own?

9. Jewelry GHC

10. Cloth (e.g. kente) GHC

11. Cash GHC

12. Foreign currency
    a. Currency CODE
    b. Amount NUMBER

13. In the past year, have you spent money on buildings (other than for basic repairs)?
    YES....1
    NO.....2 (>> END)

14. How much have you spent on buildings in:
    a. This village/town? GHC
    b. Elsewhere? GHC

EMPLOYER CODES
COMPANY <5 WORKERS.....9
COMPANY 5-10 WORKERS..10
COMPANY >10 WORKERS...11
SCHOOL.....12
CHURCH.....13
NGO OR NONPROFIT.....14
GOVERNMENT.....15
OTHER (SPECIFY).....16

Village	HHN	Respondent's name	ID Code	Date	Round

GIFTS AND TRANSFERS

Part A. Cash transfers

In the past two months, has anyone given you a gift of money which you do not need to repay? (Include dowries and inheritances.) ☐

DO NOT INCLUDE CHOP MONEY, LOANS, OR PAYMENTS FOR WORK DONE AT THIS QUESTION

1. Name of giver PROMPT FOR FULL NAME INCLUDING NICKNAMES	2. Relationship RELATIONSHIP CODE	3. Giver's location LOCATION CODE	4. Date DD/MM/YY	5. Amount received GHC	6. Reason for gift	7. Did you ask this person for the money? YES..1 NO...2 (>>9)	8. Why did you ask them (rather than someone else)?	9. How many times has this person given you money in the past year?	10. Would you ever give money to them? YES..1 NO...2

In the past two months, have you given anyone a gift of money which they do not need to repay? (Include dowries and inheritances.) ☐

DO NOT INCLUDE CHOP MONEY, LOANS, OR PAYMENTS FOR WORK DONE AT THIS QUESTION

1. Name of recipient PROMPT FOR FULL NAME INCLUDING NICKNAMES	2. Relationship RELATIONSHIP CODE	3. Recipient's location LOCATION CODE	4. Date DD/MM/YY	5. Amount given GHC	6. Reason for gift	7. Did this person ask you for the money? YES..1 NO...2 (>>9)	8. Why did they ask you (rather than someone else)?	9. How many times have you given this person money in the past year?	10. Would they ever give money to you? YES..1 NO...2

Village	HHN	Respondent's name	ID Code	Date	Round

GIFTS AND TRANSFERS

Part B. In-kind transfers

In the past two months, has anyone purchased something for you, or given you a non-monetary gift which you do not need to repay? (Include dowries and inheritances.) ☐

DO NOT INCLUDE CHOP MONEY, LOANS, OR PAYMENTS FOR WORK DONE AT THIS QUESTION

1.	2.	3.	4.	5.		6.	7.	8.	9.	10.
Name of giver	Relationship	Giver's location	Date	Item received		Reason for gift	Did you ask this person for the item?	Why did you ask them (rather than someone else)?	How many times has this person given you gifts in the past year?	Would you ever give a gift to them?
PROMPT FOR FULL NAME INCLUDING NICKNAMES	RELATIONSHIP CODE	LOCATION CODE	DD/MM/YY	DESCRIPTION	EST. VALUE GHC		YES..1 NO...2 (>>9)			YES..1 NO...2

In the past two months, have you purchased something for another person, or given anyone a non-monetary gift which they do not need to repay? (Include dowries and inheritances.) ☐

DO NOT INCLUDE CHOP MONEY, LOANS, OR PAYMENTS FOR WORK DONE AT THIS QUESTION

1.	2.	3.	4.	5.		6.	7.	8.	9.	10.
Name of recipient	Relationship	Recipient's location	Date	Item given		Reason for gift	Did this person ask for the item?	Why did they ask you (rather than someone else)?	How many times have you given this person gifts in the past year?	Would they ever give a gift to you?
PROMPT FOR FULL NAME INCLUDING NICKNAMES	RELATIONSHIP CODE	LOCATION CODE	DD/MM/YY	DESCRIPTION	EST. VALUE GHC		YES..1 NO...2 (>>9)			YES..1 NO...2

Village	HHN	Respondent's name	ID Code	Date	Round

GIFTS AND TRANSFERS

Part C. Inter-spousal transfers

1. Do you normally give your spouse money to buy food for the household?

YES...1
NO....2 (>>4)

2. How much would you give in a normal week?

	Day	Amount
a.	Monday	
b.	Tuesday	
c.	Wednesday	
d.	Thursday	
e.	Friday	
f.	Saturday	
g.	Sunday	

3. How much did you give in the week just past?

	Day	Amount
a.	Monday	
b.	Tuesday	
c.	Wednesday	
d.	Thursday	
e.	Friday	
f.	Saturday	
g.	Sunday	

4. Have you given your spouse any unusual payments of money in the past month?

	Date	Amount	Comment
a.			
b.			
c.			
d.			
e.			
f.			
g.			

5. Who usually determines these amounts?

SELF....1
SPOUSE..2

6. What factors are considered when deciding these amounts?

7. Have you given your spouse anything else of value in the past month?

YES...1
NO....2 (>>9)

8.

	Description	Value		Description	Value
a.			f.		
b.			g.		
c.			h.		
d.			i.		
e.			j.		

9. Have you given your spouse money to trade or for another business within the past month?

YES...1
NO....2
(>>END)

10.

	Description	Value		Description	Value
a.			f.		
b.			g.		
c.			h.		
d.			i.		
e.			j.		

11. What happens to the money s/he makes from trading or that business?

Village	HHN	Respondent's name	ID Code	Date	Round

LOANS QUESTIONNAIRE

Part A. Lending

In the past two months, have you given any loans of money, food or goods to other people, including your spouse? ☐

YES....USE ONE COLUMN BELOW FOR EACH LOAN GIVEN
NO..... >> PART B

			a.	b.	c.
1.	Name of recipient				
2.	Sex of recipient	MALE.....1 FEMALE...2			
3.	Relationship of recipient	RELATIONSHIP CODE			
4.	Where does the recipient live?	LOCATION CODE			
5.	When did you make the loan?	DATE			
6.	Description of item(s) lent				
7.	Cash amount or estimated value of item lent	GHC			
8.	Amount to be repaid (if cash)	GHC			
9.	What will the loan be used for?	PURPOSE CODE			
10.	Has the loan been repaid?	YES...1 (>>12) NO....2			
11.	When do you expect to be repaid?	MM/YY			
12.	Was there a witness to the loan?	YES...1 NO....2 (>>14)			
13.	Relationship of witness	RELATIONSHIP CODE			
14.	Was there any collateral?	YES...DESCRIBE NO...NEXT LOAN			
15.	How much is the collateral worth?	GHC			
16.	Who is using the collateral now?	BORROWER...1 LENDER.....2 OTHER.....3			

RELATIONSHIP CODES

SELF.....0	SIBLING.....7	FRIEND NOT IN VILLAGE....15
SPOUSE.....1	WOFA/UNCLE/AUNT.....8	PRIEST.....16
CHILD.....2	NIECE/NEPHEW.....9	EXTENSION AGENT.....17
STEP-CHILD.....3	COUSIN.....10	COOPERATIVE.....18
PARENT.....4	OTHER RELATIVE.....11	NGO.....19
GRANDCHILD.....5	VILLAGE HEAD.....12	EXPORTER.....20
GRANDPARENT.....6	LINEAGE HEAD.....13	TRADER.....21
	OTHER VILLAGER.....14	OTHER (SPECIFY).....22

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION RURAL..7
POKROM/NSABAA.....2	EASTERN REGION URBAN..8
OBOADAKA/KWAMEKROM....3	ACCRA.....9
KONKONURU.....4	OTHER URBAN.....10
ABURI.....5	OTHER RURAL.....11
NSAWAM.....6	OUTSIDE GHANA.....12

LOAN PURPOSE CODES

FARMING.....1	TRAVEL.....6
MEDICAL.....2	FUNERAL.....7
CONSUMPTION.....3	OTHER CEREMONY.....8
TRADING.....4	SCHOOL FEES.....9
OTHER BUSINESS.....5	OTHER (SPECIFY)....10

Village	HHN	Respondent's name	ID Code	Date	Round

LOANS QUESTIONNAIRE

Part A. Lending (continued)

CONTINUE LISTING LOANS ON THIS SHEET, IF REQUIRED

			d.	e.	f.
1.	Name of recipient (OPTIONAL)				
2.	Sex of recipient	MALE.....1 FEMALE...2			
3.	Relationship of recipient	RELATIONSHIP CODE			
4.	Where does the recipient live?	LOCATION CODE			
5.	When did you make the loan?	DATE			
6.	Description of item(s) lent	IF ITEM IS CASH, >>8			
7.	Cash amount or estimated value of item lent	GHC			
8.	Amount to be repaid (if cash)	GHC			
9.	What will the loan be used for?	PURPOSE CODE			
10.	Has the loan been repaid?	YES...1 (>>12) NO....2			
11.	When do you expect to be repaid?	MM/YY			
12.	Was there a witness to the loan?	YES...1 NO....2 (>>14)			
13.	Relationship of witness	RELATIONSHIP CODE			
14.	Was there any collateral?	YES...DESCRIBE NO...NEXT LOAN			
15.	How much is the collateral worth?	GHC			
16.	Who is using the collateral now?	BORROWER...1 LENDER.....2 OTHER.....3			

RELATIONSHIP CODES

SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE....15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

LOCATION CODES

DAMAN/AHWERIASE.....1
POKROM/NSABAA.....2
OBOADAKA/KWAMEKROM....3
KONKONURU.....4
ABURI.....5
NSAWAM.....6
EASTERN REGION RURAL..7
EASTERN REGION URBAN..8
ACCRA.....9
OTHER URBAN.....10
OTHER RURAL.....11
OUTSIDE GHANA.....12

LOAN PURPOSE CODES

FARMING.....1
MEDICAL.....2
CONSUMPTION.....3
TRADING.....4
OTHER BUSINESS.....5
TRAVEL.....6
FUNERAL.....7
OTHER CEREMONY.....8
SCHOOL FEES.....9
OTHER (SPECIFY)....10

Village	HHN	Respondent's name	ID Code	Date	Round

LOANS QUESTIONNAIRE

Part A1. Oustanding loans given to others

Other than the loans you mentioned earlier, have you made any loans which have not yet been fully repaid?

		a.	b.	c.
1.	Name of recipient			
2.	Description of item(s) lent			
3.	Value GHC			

4. Since our last interview, has the borrower made any repayments or give any gifts in thanks for this loan? ☐

YES..1
NO...2 (>>9)

5.	When did this occur? MM/YY			
6.	Description of item(s) received			
7.	Value GHC			
8.	Do you consider this loan to be fully repaid? YES..1 (>>NEXT LOAN) NO...2			

9. Have you given further instalments or items as part of this loan since our last interview? ☐

YES..1
NO...2 (>>13)

10.	When did this occur? MM/YY			
11.	Description of item(s) given			
12.	Value GHC			

13. Do you expect to receive anything in the future from the borrower on account of this loan? ☐

YES..1
NO...2 (>>17)

14	When do you expect to receive it? MM/YY			
15.	Description of item(s) to be received			
16.	Value GHC			

17.	Have you taken any action to obtain repayment? GIVE DESCRIPTION			
18.	Has the borrower experienced any unexpected problems which might hinder repayment? GIVE DESCRIPTION			
19.	Would you lend to this borrower again, if he asked you for a loan? YES..1 NO...2			

Village	HHN	Respondent's name	ID Code	Date	Round

LOANS QUESTIONNAIRE

Part B. Borrowing

In the past two months, have you borrowed any money, food or goods from anyone else? ☐

YES....USE ONE COLUMN BELOW FOR EACH LOAN RECEIVED
NO..... >> C

			a.	b.	c.
1.	Name of lender				
2.	Sex of lender	MALE.....1 FEMALE...2			
3.	Relationship of lender	RELATIONSHIP CODE			
4.	Where does the lender live?	LOCATION CODE			
5.	When did you receive the loan?	MM/YY			
6.	Description of item(s) borrowed				
7.	Cash amount or estimated value of item borrowed	GHC			
8.	Amount to be repaid (if cash)	GHC			
9.	What will you use the loan for?	PURPOSE CODE			
10.	Has the loan been repaid?	YES...1 NO....2 (>>12)			
11.	When do you expect to repay the loan?	MM/YY			
12.	Was there a witness to the loan?	YES...1 NO....2 (>>14)			
13.	Relationship of witness	RELATIONSHIP CODE			
14.	Was there any collateral?	YES...DESCRIBE NO...NEXT LOAN			
15.	How much is the collateral worth?	GHC			
16.	Who is using the collateral now?	BORROWER...1 LENDER.....2 OTHER.....3			

RELATIONSHIP CODES

SELF.....0	SIBLING.....7	FRIEND NOT IN VILLAGE....15	
SPOUSE.....1	WOFA/UNCLE/AUNT.....8	PRIEST.....16	
CHILD.....2	NIECE/NEPHEW.....9	EXTENSION AGENT.....17	
STEP-CHILD.....3	COUSIN.....10	COOPERATIVE.....18	
PARENT.....4	OTHER RELATIVE.....11	NGO.....19	
GRANDCHILD.....5	VILLAGE HEAD.....12	EXPORTER.....20	
GRANDPARENT.....6	LINEAGE HEAD.....13	TRADER.....21	
	OTHER VILLAGER.....14	OTHER (SPECIFY).....22	

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION RURAL..7	
POKROM/NSABAA.....2	EASTERN REGION URBAN..8	
OBOADAKA/KWAMEKROM....3	ACCRA.....9	
KONKONURU.....4	OTHER URBAN.....10	
ABURI.....5	OTHER RURAL.....11	
NSAWAM.....6	OUTSIDE GHANA.....12	

LOAN PURPOSE CODES

FARMING.....1	TRAVEL.....6
MEDICAL.....2	FUNERAL.....7
CONSUMPTION.....3	OTHER CEREMONY.....8
TRADING.....4	SCHOOL FEES.....9
OTHER BUSINESS.....5	OTHER (SPECIFY)....10

Village	HHN	Respondent's name	ID Code	Date	Round

LOANS QUESTIONNAIRE

Part B. Borrowing, continued

In the past two months, have you borrowed any money, food or goods from anyone else?

CONTINUE LISTING LOANS ON THIS SHEET, IF REQUIRED

			d.	e.	f.
1.	Name of lender				
2.	Sex of lender	MALE.....1 FEMALE...2			
3.	Relationship of lender	RELATIONSHIP CODE			
4.	Where does the lender live?	LOCATION CODE			
5.	When did you receive the loan?	MM/YY			
6.	Description of item(s) borrowed				
7.	Cash amount or estimated value of item borrowed	GHC			
8.	Amount to be repaid (if cash)	GHC			
9.	What will you use the loan for?	PURPOSE CODE			
10.	Has the loan been repaid?	YES...1 NO....2 (>>12)			
11.	When do you expect to repay the loan?	MM/YY			
12.	Was there a witness to the loan?	YES...1 NO....2 (>>14)			
13.	Relationship of witness	RELATIONSHIP CODE			
14.	Was there any collateral?	YES...DESCRIBE NO...NEXT LOAN			
15.	How much is the collateral worth?	GHC			
16.	Who is using the collateral now?	BORROWER...1 LENDER.....2 OTHER.....3			

RELATIONSHIP CODES

SELF.....0	SIBLING.....7	FRIEND NOT IN VILLAGE....15	
SPOUSE.....1	WOFA/UNCLE/AUNT.....8	PRIEST.....16	
CHILD.....2	NIECE/NEPHEW.....9	EXTENSION AGENT.....17	
STEP-CHILD.....3	COUSIN.....10	COOPERATIVE.....18	
PARENT.....4	OTHER RELATIVE.....11	NGO.....19	
GRANDCHILD.....5	VILLAGE HEAD.....12	EXPORTER.....20	
GRANDPARENT.....6	LINEAGE HEAD.....13	TRADER.....21	
	OTHER VILLAGER.....14	OTHER (SPECIFY).....22	

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION RURAL..7	
POKROM/NSABAA.....2	EASTERN REGION URBAN..8	
OBOADAKA/KWAMEKROM....3	ACCRA.....9	
KONKONURU.....4	OTHER URBAN.....10	
ABURI.....5	OTHER RURAL.....11	
NSAWAM.....6	OUTSIDE GHANA.....12	

LOAN PURPOSE CODES

FARMING.....1	TRAVEL.....6
MEDICAL.....2	FUNERAL.....7
CONSUMPTION.....3	OTHER CEREMONY.....8
TRADING.....4	SCHOOL FEES.....9
OTHER BUSINESS.....5	OTHER (SPECIFY)....10

Village	HHN	Respondent's name	ID Code	Date	Round

LOANS QUESTIONNAIRE

Part B1. Outstanding loans received from others

Other than the loans you mentioned earlier, have you received any loans which have not yet been fully repaid?

		a.	b.	c.
1.	Name of lender			
2.	Description of item(s) lent			
3.	Value GHC			

4. Since our last interview, have you made any repayments or given any gifts in thanks for this loan? ☐

YES..1
NO...2 (>>9)

5.	When did this occur? MM/YY			
6.	Description of item(s) given			
7.	Value GHC			
8.	Do you consider this loan to be fully repaid? YES..1 (>>NEXT LOAN) NO...2			

9. Have you received further instalments or items as part of this loan since our last interview? ☐

YES..1
NO...2 (>>13)

10.	When did this occur? MM/YY			
11.	Description of item(s) received			
12.	Value GHC			

13. Do you expect to make any further repayment to the lender on account of this loan? ☐

YES..1
NO...2 (>>17)

14	When do you expect to repay? MM/YY			
15.	Description of item(s) to be given			
16.	Value GHC			

17.	Has the lender taken any action to obtain repayment? GIVE DESCRIPTION			
18.	Has the lender asked for repayment? If so, why? IF RESPONSE IS 'NEEDS MONEY', PROBE WHY			
19.	Would you approach this lender again, if you needed a loan? YES..1 NO...2			

Village	HHN	Respondent's name	ID Code	Date	Round

LONG-TERM SHOCKS

Part A. Negative shocks

TO BE ADMINISTERED TO THE HEAD OF HOUSEHOLD, IF POSSIBLE

Households sometimes have good and bad surprises. I would like to know about any bad events suffered by your household in the past 10 years.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Code	Shock READ THROUGH THE LIST AND CHECK THE BOX IF THE HOUSEHOLD HAS EXPERIENCED ANY OF THESE EVENTS. THEN COMPLETE Q4-12 FOR EACH SHOCK EXPERIENCED. FINALLY, COMPLETE Q13.	Check	How many times has this shock occured in the past 10 years?	The last time this shock occurred.... When did it happen? MONTH	YEAR	What was your financial condition after the event? WORSE THAN BEFORE...1 SAME AS BEFORE.....2 BETTER THAN BEFORE..3	What was the monetary value of the loss, if any? GHC	What did you do to cope with the shock? COPING STRATEGY CODE LIST UP TO 3 1	2	3	How long did the shock last? DAYS ONGOING..999	Rank the worst three shocks over the past 10 years NUMBER THE WORST SHOCKS 1 TO 3, WHERE 1 IS THE WORST
01	Death of household head or spouse											
02	Death of other household member											
03	Loss of income due to illness or injury of household member											
04	Medical expenses due to illness or injury											
05	Loss of a regular job of a household member											
06	Lost home (e.g. due to eviction, damage, legal action)											
07	Divorce, separation or abandonment											
08	Major loss of crops due to drought											
09	Major loss of crops due to pests and disease											
10	Major loss of crops due to other reasons (e.g. flood, storm)											
11	Loss of livestock due to death											
12	Loss of livestock due to theft											
13	Loss of productive assets (due to theft, fire, river erosion, storms, flood etc.)											
14	Loss or destruction of other consumption (personal) assets											
15	Funeral expenses											
16	Division of father's property											
17	Loss of contract or default by creditor											
18	Failure or bankruptcy of business											
19	Cut-off or decrease of regular remittances to household											
20	Withdrawal of government or NGO assistance											
21	Other (specify)											
22	Other (specify)											

COPING STRATEGIES CODES

NONE.....1
SOLD LAND (SPECIFY HOMESTEAD OR AGRICULTURAL) 2
MORTGAGED/LEASED LAND (SPECIFY HOMESTEAD OR AGRICULTURAL).....3
SOLD PRODUCTIVE ASSET (SPECIFY)....4
MORTGAGED PRODUCTIVE ASSET (SP)....5
SOLD CONSUMPTION ASSET (SPECIFY)...6
MORTGAGED CONSUMPTION ASSET (SP)...7
TOOK LOAN FROM NGO/INSTITUTION.....8
TOOK LOAN FROM INFORMAL/ NON-INSTITUTIONAL SOURCE.....9
ATE LESS TO REDUCE EXPENSES.....10
ATE LOWER QUALITY FOOD TO REDUCE EXPENSES.....11
TOOK CHILDREN OUT OF SCHOOL.....12
HOUSEHOLD MEMBER TOOK JOB ELSEWHERE TEMPORARILY.....13
SENT HOUSEHOLD MEMBER AWAY PERMANENTLY/FOSTERED CHILD....14
FORCED TO CHANGE OCCUPATION.....15
MOVED TO LESS EXPENSIVE HOUSING...16
SENT NON-WORKING HOUSEHOLD MEMBER TO WORK.....17
TOOK HELP FROM OTHERS.....18
OTHER (SPECIFY).....19

Village	HHN	Respondent's name	ID Code	Date	Round

LONG-TERM SHOCKS

Part B. Positive shocks

TO BE ADMINISTERED TO THE HEAD OF HOUSEHOLD, IF POSSIBLE

Now I would like to know about any good events experienced by your household over the past 10 years.

1.	2.	3.	4	5.	6.	7.	8.	9.
Code	Shock READ THROUGH THE LIST AND CHECK THE BOX IF THE HOUSEHOLD HAS EXPERIENCED ANY OF THESE EVENTS. THEN COMPLETE Q4-8 FOR EACH SHOCK EXPERIENCED. FINALLY, COMPLETE Q9.		How many times did this occur in the past 10 years?	The last time this event occurred....				Please rank the best three of these events over the past 10 years NUMBER THE BEST SHOCKS 1 TO 3, WHERE 1 IS THE BEST
				When did it happen?		What was your financial condition after the event? WORSE THAN BEFORE...1 SAME AS BEFORE.....2 BETTER THAN BEFORE..3	What was the total value of your gain? GHC	
		Check		MONTH	YEAR			
01	New regular job for household member							
02	Young person or child went to work for the first time							
03	New or increased remittances							
04	Inheritance							
05	Large gift/lottery winnings							
06	Receipt of dowry/brideprice							
07	Unusually large gain from business activities (specify)							
08	Scholarship for child's education							
09	New government or NGO program/assistance							
10	Other (specify)							
11	Other (specify)							
12	Other (specify)							

Village	HHN	Respondent's name	ID Code	Date	Round

SHOCKS DURING 2009

Part A. Negative Shocks

	1. Since the start of the year, has your household experienced any of the following shocks? NOTE: LIST REPEAT OCCURRENCES UNDER 'OTHER' YES...CHECK BOX AND ANSWER Q3-8 NO....>> NEXT ITEM	2.	3. ID code of HH member most directly affected ID CODE	4. Start date (or date of occurrence) MM/YY	5. What was the total value of the loss? (Per month, if continuous.) GHC	6. Did you have enough money to cover the expenses? YES....1 (>>NEXT) NO.....2	7. How did you raise the money to cover the expenses?	8. Other comments (e.g. further details on the shock)
a.	Funeral expenses							
b.	Medical expenses due to illness or injury							
c.	Loss of income due to illness or injury							
d.	Crop loss or damage							
e.	Livestock loss or theft							
f.	Property damage or theft							
g.	Loss of contract, or default by creditor							
h.	Loss of regular job							
i.	Failure of business, or significant business losses							
j.	Other: _____							
k.	Other: _____							
l.	Other: _____							

Part B. Positive Shocks

	1. Since the start of the year, has your household experienced any of the following shocks? NOTE: LIST REPEAT OCCURRENCES UNDER 'OTHER' YES...CHECK BOX AND ANSWER Q3-8 NO....>> NEXT ITEM	2.	3. ID code of HH member most directly affected ID CODE	4. Start date (or date of occurrence) MM/YY	5. What was the total value of the gain? (Per month, if continuous.) GHC	6. Have you given significant gifts to others as a result of this event? YES....1 NO.....2 (>>8)	7a. To whom did you give gifts? RELATIONSHIP CODES	7b. What was the total value of these gifts? GHC	8. Other comments (e.g. further details on the shock)
a.	Lottery or prize winnings								
b.	New job								
c.	Inheritance / brideprice								
d.	Unexpectedly large crop yield or sales								
e.	Unexpectedly high business profits								
f.	New remittances								
g.	Other: _____								
h.	Other: _____								
i.	Other: _____								

Village	HHN	Respondent's name	ID Code	Date	Round

PERCEPTIONS OF POVERTY AND WELL-BEING

TO BE ADMINISTERED TO THE HEAD OF HOUSEHOLD, IF POSSIBLE

We would like to ask you some questions about your circumstances now and over the past few years.

1. Concerning your family's food consumption over the past month, which of the following is true?

IT WAS LESS THAN ADEQUATE...1
IT WAS JUST ADEQUATE.....2
IT WAS MORE THAN ADEQUATE....3

2. Concerning your family's housing over the past month, which of the following is true?

IT WAS LESS THAN ADEQUATE...1
IT WAS JUST ADEQUATE.....2
IT WAS MORE THAN ADEQUATE....3

3. Concerning your family's clothing over the past month, which of the following is true?

IT WAS LESS THAN ADEQUATE...1
IT WAS JUST ADEQUATE.....2
IT WAS MORE THAN ADEQUATE....3

4. Concerning the health care your family gets, which of the following is true?

IT IS LESS THAN ADEQUATE....1
IT IS JUST ADEQUATE.....2
IT IS MORE THAN ADEQUATE.....3
NOT APPLICABLE.....4

5. Concerning your children's schooling, which of the following is true?

IT IS LESS THAN ADEQUATE....1
IT IS JUST ADEQUATE.....2
IT IS MORE THAN ADEQUATE.....3
NOT APPLICABLE.....4

6. Compared to other households in this village, would you describe your household as:

THE RICHEST.....1
AMONG THE RICHEST.....2
RICHER THAN MOST HOUSEHOLDS..3
ABOUT AVERAGE.....4
POORER THAN MOST HOUSEHOLDS..5
AMONGST THE POOREST.....6
THE POOREST.....7

7. Which of the following is true about your current income?

ALLOWS YOU TO SAVE A LOT.....1
ALLOWS YOU TO SAVE JUST A LITTLE.....2
ONLY JUST MEETS YOUR EXPENSES.....3
INSUFFICIENT, SO OFTEN NEED TO USE YOUR SAVINGS TO MEET EXPENSES....4
REALLY INSUFFICIENT, SO OFTEN NEED TO BORROW TO MEET EXPENSES.....5

8. Right now, would you say your household...

IS VERY RICH.....1
IS RICH.....2
IS COMFORTABLE.....3
MANAGES TO GET BY.....4
NEVER HAS QUITE ENOUGH....5
IS POOR.....6
IS DESTITUTE.....7

9. 1 year ago, would you say your household...

WAS VERY RICH.....1
WAS RICH.....2
WAS COMFORTABLE.....3
MANAGED TO GET BY.....4
NEVER HAD QUITE ENOUGH....5
WAS POOR.....6
WAS DESTITUTE.....7
HOUSEHOLD DIDN'T EXIST....8

10. 5 years ago, would you say your household...

WAS VERY RICH.....1
WAS RICH.....2
WAS COMFORTABLE.....3
MANAGED TO GET BY.....4
NEVER HAD QUITE ENOUGH....5
WAS POOR.....6
WAS DESTITUTE.....7
HOUSEHOLD DIDN'T EXIST....8

11. 10 years ago, would you say your household...

WAS VERY RICH.....1
WAS RICH.....2
WAS COMFORTABLE.....3
MANAGED TO GET BY.....4
NEVER HAD QUITE ENOUGH....5
WAS POOR.....6
WAS DESTITUTE.....7
HOUSEHOLD DIDN'T EXIST....8

12. In terms of your household economic well-being, are you better off, the same as, or worse off than this same time a year ago?

MUCH BETTER NOW.....1
A LITTLE BETTER NOW.....2
NO CHANGE.....3
A LITTLE WORSE NOW.....4
MUCH WORSE NOW.....5
DON'T KNOW.....6

Village	HHN	Respondent's name	ID Code	Date	Round

PERCEPTIONS OF POVERTY AND WELL-BEING

TO BE ADMINISTERED TO THE HEAD OF HOUSEHOLD, IF POSSIBLE

Continued

13. Compared to a year ago, why have your circumstances changed?

LIST UP TO 3 RESPONSES

a. ☐

b. ☐

c. ☐

14. In terms of your household economic well-being, in a year from now, do you expect to be better off, the same as, or worse off than now? ☐

MUCH BETTER OFF.....1
A LITTLE BETTER OFF.....2
NO CHANGE.....3
A LITTLE WORSE OFF.....4
MUCH WORSE OFF.....5
DON'T KNOW.....6

15. Why do you expect this change? LIST UP TO 3 RESPONSES

a. ☐

b. ☐

c. ☐

16. If your household needed 50 cedi for an emergency, could you obtain it within a week? ☐

YES...1
NO....2 (>>18)

17. How would your household obtain the 50 cedi?

☐

Now I would like to ask you some questions about trust. Do you agree or disagree with the following statements?

FOR EACH QUESTION, ASK THE RESPONDENT TO CHOOSE ONE OF THE FOLLOWING CODES

STRONGLY AGREE.....1
AGREE.....2
NEUTRAL.....3
DISAGREE.....4
STRONGLY DISAGREE.....5
NO EXPERIENCE.....6

18. Most people are basically honest. ☐

19. Most people can be trusted. ☐

20. I believe that the government does what is right for the people. ☐

21. I am confident of the ability of government officials to do their job. ☐

22. I could rely on my neighbor to mail an important letter for me. ☐

23. I feel I could trust my neighbors to look after my house if I am away. ☐

Village	HHN	Respondent's name	ID Code	Date	Round

MEMBERSHIP OF ORGANIZATIONS AND COOPERATIVES

Part A. Membership of organizations

I would like to know about the organizations you belong to.

1. Name of organization FIRST LIST ALL ORGANIZATIONS RESPONDENT BELONGS TO, OTHER THAN THOSE PRE-PRINTED. THEN ANSWER Q2-6 FOR EACH ORGANIZATION.	2. What type of organization is it?	3. Have you attended meetings for this organization in the past year? YES....1 NO.....2	4. Who told you about the group, or invited you to join? RELATIONSHIP CODE OR DESCRIPTION	5. How often do you attend, on average? FREQUENCY CODE	6. Location LOCATION CODE	7. Total amount paid to the organization in the past year GHC	8. Total amount received from the organization in the past year GHC	9. Has the group given you any other assistance or advice? IF YES, GIVE DESCRIPTION
Sie wo ho	Funeral organization							
Biakoye kuo	Farming organization							
Onipa Hiamoa Kuw								

RELATIONSHIP CODES

NO-ONE.....0	WOFA/UNCLE/AUNT.....8	PRIEST.....16
SPOUSE.....1	NIECE/NEPHEW.....9	EXTENSION AGENT.....17
CHILD.....2	COUSIN.....10	COOPERATIVE.....18
STEP-CHILD.....3	OTHER RELATIVE.....11	NGO.....19
PARENT.....4	VILLAGE HEAD.....12	EXPORTER.....20
GRANDCHILD.....5	LINEAGE HEAD.....13	TRADER.....21
GRANDPARENT.....6	OTHER VILLAGER.....14	OTHER (SPECIFY).....22
SIBLING.....7	FRIEND NOT IN VILLAGE....15	

LOCATION CODES

DAMAN/AHWERIASE.....1	EASTERN REGION (RURAL)....7
POKROM/NSABAA.....2	EASTERN REGION (URBAN)....8
OBOADAKA/KWAMEKROM.....3	ACCRA.....9
KONKONURU.....4	OTHER URBAN.....10
ABURI.....5	OTHER RURAL.....11
NSAWAM.....6	NOT IN GHANA.....12

FREQUENCY CODES

DAILY.....1
WEEKLY.....2
FORTNIGHTLY.....3
MONTHLY.....4
QUARTERLY.....5
HALF-YEARLY.....6
YEARLY.....7
OTHER (SPECIFY).....8

Village	HHN	Respondent's name	ID Code	Date	Round

MEMBERSHIP OF ORGANIZATIONS AND COOPERATIVES

Part B. Membership of FBOs and cooperatives

Have you belonged to any farmer-based organisations, cooperatives or work groups in the past five years? ☐

FIRST ANSWER Q1 FOR ALL GROUPS, THEN ANSWER Q2-16 FOR EACH GROUP. USE ADDITIONAL SHEET IF REQUIRED.

			GROUPS			
			1	2	3	4
1.	Name of group					
2.	Name of group organizer/contact (if known)					
3.	What type of group is it?	COOPERATIVE.....1 SUPPORT GROUP.....2 WORK GROUP.....3 OTHER (SPECIFY)...4				
4.	Who told you about the group, or invited you to join?	RELATIONSHIP CODE OR DESCRIPTION				
5.	When did you join the group?	DATE (MM/YY)				
6.	Why did you join the group?					
7.	Are you still a member?	YES....1 (>>Q10) NO.....2				
8.	When did you leave the group?	DATE (MM/YY)				
9.	Why did you leave?					
10.	How often do you meet?	FREQUENCY CODE				
11.	Does the group share labor?	YES....1 NO.....2				
12.	Does the group share other inputs or assets (e.g. a tractor)?	YES....1 NO.....2				
13.	Does the group discuss farming practices?	YES....1 NO.....2				
14.	Have you changed your farming practices since learning information from this group?	YES....1 NO.....2				
15.	Does the group hold GlobalGAP certification?	YES....1 NO.....2				
16.	Does the group have a contract with a buyer or exporter?	YES....1 NO.....2				

RELATIONSHIP CODES

NO-ONE.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE....15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

FREQUENCY CODES

DAILY.....1
WEEKLY.....2
FORTNIGHTLY.....3
MONTHLY.....4
QUARTERLY.....5
HALF-YEARLY.....6
YEARLY.....7
OTHER (SPECIFY).....8

Village	HHN	Respondent's name	ID Code	Date	Round

EDUCATION

1. What is the highest grade/mode of education you have attended?

NONE/K.G.....0	JSS 1.....6	M4.....12	S3.....18
PRIMARY 1....1	JSS 2.....7	SSS1.....13	S4.....19
PRIMARY 2....2	JSS 3.....8	SSS2.....14	S5.....20
PRIMARY 3....3	M1.....9	SSS3.....15	VOC/COMM....21
PRIMARY 4....4	M2.....10	S1.....16	TECHNICAL...22
PRIMARY 5....5	M3.....11	S2.....17	UNIVERSITY..23

2. How many years did you attend school for?

3. Where did you attend school for the most time?

THIS VILLAGE.....1	OTHER RURAL.....5
OTHER VILLAGE IN DISTRICT...2	OTHER URBAN.....6
OTHER DISTRICT IN REGION....3	OUTSIDE GHANA.....7
ACCRA.....4	

4. Why did you leave school?

HAD ENOUGH EDUCATION.....1	SCHOOL CLOSED.....6
FAILED EXAM.....2	I WAS ILL.....7
NO HIGHER SCHOOL/GRADE.....3	MARRIAGE/PREGNANCY.....8
COULD NOT AFFORD TO GO.....4	OTHER (SPECIFY).....9
TO HELP PARENTS.....5	

5. Can you read a sentence in Akuapem Twi?

SHOW FLASHCARD FOR AKUAPEM TWI

READ WITHOUT ERRORS....1
READ WITH ERRORS.....2
COULD NOT READ.....3
REFUSED.....999

6. In which language are you most proficient?

AKUAPEM TWI.....1 (>>8)	GA.....4
ASANTE TWI.....2	EWE.....5
FANTE.....3	OTHER (SPECIFY)....6 (>>8)

7. Can you read a sentence in this language?

SHOW FLASHCARD FOR LANGUAGE

READ WITHOUT ERRORS....1
READ WITH ERRORS.....2
COULD NOT READ.....3
REFUSED.....999

8. Do you speak English?

YES....1
NO.....2 (>>10)

9. Can you read a sentence in English?

SHOW FLASHCARD FOR ENGLISH

READ WITHOUT ERRORS....1 (>>12)
READ WITH ERRORS.....2 (>>12)
COULD NOT READ.....3
REFUSED.....999

10. Is there someone in your household who can read English for you?

YES...GIVE ID CODE
NO....LEAVE BLANK (>>13)

11. Can they read a sentence in English?

LOCATE THE PERSON NOMINATED AND ASK THEM TO READ THE FLASHCARD FOR ENGLISH

READ WITHOUT ERRORS....1
READ WITH ERRORS.....2
COULD NOT READ.....3 (>>13)
REFUSED.....999

12. Language comprehension

GIVE COMPREHENSION TEST TO RESPONDENT OR NOMINATED PERSON AND RECORD ANSWERS

1.		4.		7.	
2.		5.		8.	
3.		6.			

13. Basic arithmetic

GIVE MATHS TEST TO THE RESPONDENT AND RECORD ANSWERS

1.		4.		7.	
2.		5.		8.	
3.		6.			

14. Is there someone in your household who does sums for you?

YES..GIVE ID CODE
NO...LEAVE BLANK

Village	HHN	Respondent's name	ID Code	Date	Round

FAMILY BACKGROUND

Part A. Family structure and wealth

1. Which clan do you belong to?

2. Do you hold a family or village office?
   YES....1
   NO.....2 (>>Q4)
   Name / title:

3. What privileges (if any) does this office give you?

4. Who is the highest-ranked individual in your extended family? RELATIONSHIP CODE

5. What privileges (if any) does their office give them?

6. Family home town:

7. Region:

8a. Are you the first from your family to live in this village?
   YES....1 (>>8c)
   NO.....2

b. Approximately how long has your family lived here? YEARS/MONTHS

c. Approximately how long have you lived here? YEARS/MONTHS

9. Please tell me about the amount of land belonging to your extended family.

	Total size		Approx. % of total family land	Area cultivated by self and spouse
	UNIT	AMOUNT		
Total family land area				
Family land area in this town				

10. What income did the family earn in the past year from renting out land? GHC

11. a. How much land has the family sold or leased in the past year? AREA

    b. How much income did they receive for it? GHC

Part B. Parents' Economic Background

I would like to ask some questions about your parents.		Mother	Father
1.	Birthplace LOCATION CODE		
2.	Highest school grade completed		
3.	First occupation OCCUPATION CODE		
4.	Second occupation OCCUPATION CODE		
5.	Main residence LOCATION CODE		
6.	Wife number / number of wives		
7.	Number of children		
8.	Year of death (if applicable)		
9.	Did s/he hold a village office? YES...1 NO....2		
10.	If yes, what was its name?		

Village	HHN	Respondent's name	ID Code	Date	Round

FAMILY BACKGROUND

Part C. Fosterage

Did you live with anyone away from your parents for at least a year while you were growing up?

☐ YES...1
NO....2 (>> PART D)

		Location 1	Location 2	Location 3
a.	Place you lived — LOCATION CODE			
b.	Age you started / ended living there			
c.	Reason for fostering			
d.	Relationship of carer(s) — RELATIONSHIP CODE			
e.	If wofa, uncle or aunt, on whose side? — FATHER...1 MOTHER...2			
f.	Foster parent's: occupation			
g.	number of farms			
h.	main farming activity			

Part D. Inheritances

1. Do you expect to receive any inheritances of land?

☐ YES...1
NO....2 (>> 2)

		Plot 1	Plot 2	Plot 3
a.	Date you expect to receive it — MM/YY			
b.	Relationship of current owner — RELATIONSHIP CODE			
c.	Location of current owner — LOCATION CODE			
d.	Gender of current owner — MALE....1 FEMALE..2			
e.	Land size — UNIT			
f.	— QUANTITY			
g.	Location — CODE			
h.	When inherited, will it be developed or fallow?			
i.	What will be the main crop grown?			
j.	What is the land worth now? — GHC			

Part D. Inheritances, continued

2. Do you expect to receive any other inheritances (such as houses or money)?

☐ YES...1
NO....2 (>> 3)

		Item 1	Item 2	Item 3
a.	Description of item(s) promised			
b.	Date you expect to receive it — MM/YY			
c.	Relationship of current owner — RELATIONSHIP CODE			
d.	Location of current owner — LOCATION CODE			
e.	Gender of current owner — MALE....1 FEMALE..2			
f.	Is the item a house? — YES..1 NO...2 (>>Q3)			
g.	Location of house — LOCATION CODE			
h.	What is it worth now? — GHC			

3. Did you receive any assistance from your parents or relatives when you established your household?

☐ YES...1
NO....2 (>>END)

		Assistance 1	Assistance 2	Assistance 3
a.	Date you received assistance — MM/YY			
b.	Description of item(s) given			
c.	Relationship of person — RELATIONSHIP CODE			
d.	Gender of current owner — MALE....1 FEMALE..2			
e.	Location of person — LOCATION CODE			
f.	Land size given (if any) — IF NONE, (>>h)			
g.	Location of land — LOCATION CODE			
h.	Was it a loan or a gift? — LOAN...1 GIFT...2 (>>NEXT COLUMN)			
i.	Have you repaid the loan? — YES...1 NO....2			
j.	What would it be worth now? — GHC			

Village	HHN	Respondent's name	ID Code	Date	Round

MARITAL ATTITUDES

COMPLETE THIS MODULE FOR EACH SPOUSE

In this section we would like to ask you some questions about relationships in your household. Please remember that this survey is entirely confidential and your responses will not be shared with anyone. All the same, you do not have to answer any question if you do not want to.

NOTE: CODE REFUSALS AS 999

1. Where does your spouse live? ☐

SAME HOUSE.....1 (>>Q3)
DIFFERENT HOUSE IN
THIS VILLAGE....2 (>>Q3)
ELSEWHERE.....3

2. How often do you see your spouse? FREQUENCY CODE ☐

3. Overall, how well do you get along with your spouse? ☐

VERY WELL.....1
WELL.....2
SATISFACTORY.....3
NOT SO WELL.....4
NOT WELL AT ALL....5

For questions 4 and 5, use the following codes:

COMPLETELY.....1
MOSTLY.....2
SOMEWHAT.....3
NOT MUCH.....4
NOT AT ALL.....5

4. On a scale of one to five, how much do you trust your spouse? ☐

5. On a scale of one to five, how fairly does your spouse treat you? ☐

Now I would like to ask you about how you both manage the house and farm.

6. Do you think your spouse does his/her fair share of work on the farm? YES...1 NO....2 ☐

7. What would you do if s/he does not do enough?

8. Do you think your spouse does enough work around the house? YES...1 NO....2 ☐

9. What would you do if s/he does not do enough?

10. Does your spouse contribute to the household finances? YES...1 NO....2 ☐

11. a. Does s/he contribute enough? YES...1 (>> 12) NO....2 ☐

b. Why not?

12. What would you do if it is not enough?

13. Are there certain things in the house that you always buy? YES...1 NO....2 ☐

If yes, what are they?

14. Are there certain things in the house that your spouse always buys? ☐

If yes, what are they?

15. Are there certain expenses (e.g. school fees, funeral expenses) that you always pay for? YES...1 NO....2 ☐

If yes, what are they?

16. Are there certain expenses (e.g. school fees, funeral expenses) that your spouse always pays for? YES...1 NO....2 ☐

If yes, what are they?

17. a. Do you lend money to your spouse? YES...1 NO....2 (>> END) ☐

b. How much have you lent in the past 6 months? GHC

c. " in the past month? GHC

d. What were the amounts for?

e. Do you have trouble getting it back? YES...1 (>> END) NO....2 ☐

f. Does this lead to quarrels? YES...1 NO....2 ☐

Village	HHN	Respondent's name	ID Code	Date	Round

HOUSING OWNERSHIP AND INHERITANCE

Part A. House currently lived in by respondent

1. Describe the type of dwelling you live in.

ROOM.....1
APARTMENT.....2
SELF-CONTAINED HOUSE....3
COMPOUND.....4
OTHER.....SPECIFY

2. Do you own the dwelling?

YES...1
NO....2 (>> 7)

3. How did you acquire it?

BUILT MYSELF.....1 (>> 5)
PURCHASED.....2
INHERITED.....3
RECEIVED AS A GIFT....4
FAMILY HOUSE.....5 (>> 5)

4. a,b. From whom did you acquire it?

RELATIONSHIP CODE

MALE....1
FEMALE..2

c. If wofa, uncle or aunt, on whose side?

FATHER...1
MOTHER...2

5. When did you acquire it or build it?

DD/MM/YY

6. a. Have you ever made improvements to the dwelling?

YES...1
NO....2

b. If yes, describe

(>> PART B)

7. Who owns the dwelling?

RELATIONSHIP CODE

MALE....1
FEMALE..2

8. Where does the owner live?

LOCATION CODE

9. How do you have access to the dwelling?

FREE TENANCY.....1
RENT-PAYING TENANT....2
OTHER.....SPECIFY

Part B. Other houses owned by respondent

1. Do you own any houses other than the one you are living in?

YES...1
NO....2 (>>END)

For each house owned (*other* than the one described in Part A), complete one column in the table.

		House 1	House 2	House 3
2.	Location LOCATION CODE			
3.	How did you acquire it? BUILT MYSELF.....1 (>>5) PURCHASED.....2 INHERITED.....3 RECEIVED AS A GIFT...4 FAMILY HOUSE.....5 (>>5)			
4.	From whom did you purchase/inherit/receive it? RELATIONSHIP CODE			
5.	Who stays in this house? SPOUSE.....1 CHILDREN.....2 FAMILY MEMBERS.....3 RENT-PAYING TENANTS..4 NO-ONE.....5 OTHER.....SPECIFY			

Village	HHN	Respondent's name	ID Code	Date	Round

ON-FARM DECISION MAKING

To be administered to respondents with at least one plot, who currently cultivate crops

1. a. Which members of this household are involved in crop cultivation?

LIST RELATIONSHIP CODES IF RESPONDENT IS NOT INCLUDED, >> END

b. Which members are involved in input allocation decisions on your plot(s)?

LIST RELATIONSHIP CODES IF RESPONDENT IS NOT INCLUDED, >> END

c. What is the most important factor in deciding how much to cultivate on your plot(s)? ☐

```
CASH AVAILABLE........1          LAND AVAILABLE.........5
LABOUR AVAILABLE......2          HOW I FEEL / MY HEALTH.6
EXPECTED RAINFALL.....3          ALWAYS THE SAME........7
EXPECTED PRICE/PROFIT.4          OTHER (SPECIFY)........8
```

2. a. Do you use pesticides? ☐

```
YES...1
NO....2 (>> Q2c)
```

b. Aside from the size of your plot, what is the most important factor in deciding how much **pesticide** to apply? ☐

```
CASH AVAILABLE.................1     AMOUNT RECOMMENDED BY
GROWING CONDITIONS OF CROPS....2       EXTENSION OFFICER/OTHERS.....5
SEVERITY OF PEST INFESTATION...3     NONE (ALWAYS THE SAME AMOUNT)..6
CROP PRICES / EXPECTED PROFIT..4     OTHER (SPECIFY).................7
```

c. Do you use fertilizer? ☐

```
YES...1
NO....2 (>> Q2e)
```

d. Aside from the size of your plot, what is the most important factor in deciding how much **fertilizer** to apply? ☐

```
CASH AVAILABLE.................1     AMOUNT RECOMMENDED BY
GROWING CONDITIONS OF CROPS....2       EXTENSION OFFICER/OTHERS.....5
EXPECTED RAINFALL..............3     NONE (ALWAYS THE SAME AMOUNT)..6
CROP PRICES / EXPECTED PROFIT..4     OTHER (SPECIFY).................7
```

e. What is the most important factor in deciding how much time you spend weeding your plot? ☐

```
CASH AVAILABILITY..............1     AMOUNT OF WEEDS................6
GROWING CONDITIONS OF CROPS....2     LABOR AVAILABILITY.............7
EXPECTED RAINFALL..............3     NONE (ALWAYS THE SAME AMOUNT)..8
CROP PRICES / EXPECTED PROFIT..4     OTHER (SPECIFY).................9
HOW I FEEL / MY HEALTH.........5
```

3. a. Have you ever grown pineapples? ☐

```
YES...1
NO....2 (>> Q5)
```

b. Which type(s)? ☐

```
SUGARLOAF........1
SMOOTH CAYENNE...2
MD2..............3
OTHER (SPECIFY)..4
```

c. When did you start growing pineapples? MM/YY ☐

d. Are you still growing pineapples? ☐

```
YES...1 (>> Q4)
NO....2
```

e. When did you stop growing pineapples? MM/YY ☐

f. Why did you stop?

NOW GO TO QUESTION 5

4. a. How do you plant your pineapples? ☐

```
RAISED BEDS IN ROWS...1
ON THE FLAT IN ROWS...2
OTHER (SPECIFY).......3
```

b. What type(s) of planting materials do you use? ☐

```
SUCKERS....1
CROWNS.....2
OTHER......3
```

c. Do you use hired labor to farm your pineapples? ☐

```
YES...1
NO....2
```

d. To what extent does the availability of cash affect your decisions about the following:

(i) Timing of harvest ☐

(ii) Quality of harvest ☐

(iii) Price received for pineapples ☐

(iv) Ability to transport produce ☐

(v) Timing of next planting / harvest ☐

```
NO EFFECT............1
SMALL EFFECT.........2
MODERATE EFFECT......3
STRONG EFFECT........4
VERY STRONG EFFECT...5
```

Village	HHN	Respondent's name	ID Code	Date	Round

ON-FARM DECISION MAKING, Continued

5. a. Have you ever received formal training in pineapple cultivation?

YES..1
NO...2

b. Have you ever received formal training in cultivation of crops other than pineapple?

YES...1
NO....2 (>> Q6)

c. For which crops did you receive training?

CROP CODE(S)

d. From where / from whom did you get the training?

RELATIONSHIP CODE(S)

6. What problems have you experienced on your plot(s) in the past 10 years? For example, diseases, pests, crop losses, drought.

	1	2	3	4	5	6	7	8
	Plot PLOT CODE	Event EVENT CODE	Crops affected CROP CODE	Date MM/YY	Percentage of plot PER CENT	Severity CODE	Value of damage GHC	Response RESPONSE CODE
a.								
b.								
c.								
d.								
e.								
f.								
g.								
h.								

7. Compared to the average plot in this area, how fertile are your plots?

MUCH MORE THAN AVERAGE..1
MORE THAN AVERAGE.....2
AVERAGE.....3
LESS THAN AVERAGE.....4
MUCH LESS THAN AVERAGE..5
NOT APPLICABLE.....6

a. Plot 1 b. Plot 2 c. Plot 3
d. Plot 4 e. Plot 5 f. Plot 6

8. *Risk aversion experiment*

a.

	A	B
1		
2		
3		
4		
5		
▶ 6		
7		
8		
9		
10		
11		

c.

	A	B
1		
2		
3		
4		
5		
▶ 6		
7		
8		
9		
10		
11		

b.

	A	B
1		
2		
3		
4		
▶ 5		
6		
7		
8		
9		

d.

	A	B
1		
2		
3		
4		
▶ 5		
6		
7		
8		
9		

EVENT CODES
TERMITES.....1
OTHER INSECTS.....2
RODENTS.....3
GRASSCUTTER.....4
OTHER ANIMAL.....5
WILT.....6
LEAVES FALLING OFF..7
MUSHROOM/FUNGI.....8
ROTTEN ROOTS.....9
ROTTEN CROPS.....10
DROUGHT/LOW RAIN...11
FLOOD.....12
CHEMICAL DAMAGE....13
PLANTING ERROR.....14
OTHER DISEASE.....15
NO MARKET FOR CROP.16
THEFT.....17
UNINTENDED FIRE....18
OTHER (SPECIFY)....19

SEVERITY CODES
MINOR.....1
NOTICEABLE LOSS.....2
SIGNIFICANT LOSS....3
MAJOR LOSS.....4
TOTAL CROP FAILURE..5

RESPONSE CODES
NONE.....1
REPLANT.....2
APPLY CHEMICALS.....3
HAND PICKING.....4
STOP CULTIVATING.....5
UPROOT AFFECTED AREA..6
UPROOT ENTIRE PLOT.....7
DESTROY AFFECTED CROP..8
MAKE TRAPS.....9
CHANGE SEED/VARIETY...10
CHANGE METHOD OF PLANTING.....11
TREAT SEEDS.....12
TREAT SUCKERS.....13
CAN WATERING.....14
PUMP IRRIGATION.....15
WEEDING.....16
OTHER (SPECIFY).....17

Village	HHN	Respondent's name	ID Code	Date	Round

PLOT MAPPING

PLEASE ENSURE PLOT CODES CORRESPOND TO THOSE IN PLOT QUESTIONNAIRE

RESPONDENT ID [ ]

WAS RESPONDENT PRESENT DURING MEASUREMENT? [ ]

YES...1
NO....2

USE ONE ROW FOR EACH PLOT, WITH EACH COLUMN REPRESENTING A VERTEX OF THE PLOT

NOTE: IF YOU RUN OUT OF COLUMNS, ENTER SAME PLOT CODE ON NEXT LINE AND CONTINUE FROM COLUMN 1

	1		2		3		4		5		6	
Plot code	N	W	N	W	N	W	N	W	N	W	N	W

REMARKS AND OBSERVATIONS

SCHEDULE OF CODES

RELATIONSHIP CODES
SELF.....0
SPOUSE.....1
CHILD.....2
STEP-CHILD.....3
PARENT.....4
GRANDCHILD.....5
GRANDPARENT.....6
SIBLING.....7
WOFA/UNCLE/AUNT.....8
NIECE/NEPHEW.....9
COUSIN.....10
OTHER RELATIVE.....11
VILLAGE HEAD.....12
LINEAGE HEAD.....13
OTHER VILLAGER.....14
FRIEND NOT IN VILLAGE....15
PRIEST.....16
EXTENSION AGENT.....17
COOPERATIVE.....18
NGO.....19
EXPORTER.....20
TRADER.....21
OTHER (SPECIFY).....22

SCHOOL LEVEL CODES
NONE.....0
PRIMARY.....1
MIDDLE OR JSS.....2
SENIOR SEC, TECH, COMMTY
OR TRAINING COLLEGE....3
POST-SEC, NURSING, POLY..4
UNIVERSITY.....5

LOCATION CODES
DAMAN/AHWERIASE.....1
POKROM/NSABAA.....2
OBOADAKA/KWAMEKROM.....3
KONKONURU.....4
ABURI.....5
NSAWAM.....6
EASTERN REGION (RURAL) 7
EASTERN REGION (URBAN) 8
ACCRA.....9
OTHER URBAN.....10
OTHER RURAL.....11
NOT IN GHANA.....12

CROP CODES
CASSAVA.....1
MAIZE.....2
PLANTAIN.....3
COCOYAM.....4
YAM.....5
PINEAPPLE.....6
TOMATO.....7
GARDEN EGG.....8
OKRO.....9
PEPPER.....10
ORANGES.....11
BANANA.....12
AVOCADO.....13
OIL PALM.....14
COCOA.....15
SUGAR CANE.....16
BEAN.....17
GROUNDNUT.....18
OTHER (SPECIFY).....19

OCCUPATION CODES
FARMER.....1
TEACHER.....2
TAXI/TRO-TRO DRIVER.....3
TRUCK DRIVER.....4
ARTISAN.....5
CONSTRUCTION WORKER.....6
FACTORY WORKER.....7
MASON.....8
CARPENTER/CARVER.....9
HERBALIST.....10
HAIRDRESSER.....11
HEALTH WORKER.....12
OFFICE WORKER.....13
SHOP ATTENDANT/TRADER...14
BAKER/COOK.....15
PRIEST.....16
ELDER.....17
STUDENT.....18
UNEMPLOYED.....19
NOT IN LABOR FORCE.....20
OTHER (SPECIFY).....21

LOAN PURPOSE CODES
FARMING.....1
MEDICAL.....2
CONSUMPTION.....3
TRADING.....4
OTHER BUSINESS.....5
TRAVEL.....6
FUNERAL.....7
OTHER CEREMONY.....8
SCHOOL FEES.....9
OTHER (SPECIFY).....10

INPUT CODES
INSECTICIDE/PESTICIDE.....1
BIOLOGICAL CONTROL.....2
HERBICIDE.....3
FUNGICIDE.....4
FERTILIZER.....5
OTHER CHEMICAL.....6
SPRAYING COSTS.....7
TRACTOR PLOWING.....8
TRANSPORT COSTS.....9
OTHER COMMERCIAL INPUT...10
PROTECTIVE CLOTHING.....11
BAGS, DRUMS, CONTAINERS..12
SUCKERS.....13
SEEDS.....14
SEEDLINGS.....15
OTHER (SPECIFY).....16

EMPLOYER CODES
SPOUSE.....1
CHILD.....2
PARENT.....3
OTH HH MEMBER.....4
OTH RELATIVE.....5

FRIEND IN VILLAGE.....6
FRIEND ELSEWHERE.....7
OTHER VILLAGER.....8
COMPANY <5 WORKERS.....9
COMPANY 5-10 WORKERS..10
COMPANY >10 WORKERS...11

SCHOOL.....12
CHURCH.....13
NGO OR NONPROFIT.....14
GOVERNMENT.....15
OTHER (SPECIFY).....16

UNIT CODES
NUMBER.....1
GRAMS.....2
KILOGRAMS.....3
POUNDS.....4
MINIBAG.....5
MAXIBAG.....6
LITRES.....7
ROPES.....8
BUNCHES.....9
BALLS.....10
LOAVES.....11
BUNDLES.....12
BEER BOTTLES.....13
OLONKA/AMERICAN TINS....14
BUCKETS.....15
SMALL BASKETS.....16
LARGE BASKETS.....17
TOMATO TINS (SMALL).....18
TOMATO TINS (LARGE).....19
MARGARINE TIN (SMALL)...20
MARGARINE TIN (LARGE)...21
HEADLOADS.....22
SACHETS/PACKETS.....23
TUBERS.....24
STICKS.....25
OTHER (SPECIFY).....26

FREQUENCY CODES
DAILY.....1
WEEKLY.....2
FORTNIGHTLY.....3
MONTHLY.....4
QUARTERLY.....5
HALF-YEARLY.....6
YEARLY.....7
OTHER (SPECIFY).....8

Village Name | Household ID | Enumerator ID | Page / of

Village Code | Respondent Name | Respondent ID

SOCIAL NETWORK QUESTIONNAIRE

COMPLETE FOR ENTIRE LIST OF PREPRINTED NAMES

I would like to ask you about your relationships with some of the people in this village.

1	2	3	4	5	6	7	8	9	10	11	12
HH No.	**ID**	**Name** IF PERSON DOES NOT RECOGNISE FORMAL NAME, PROMPT FOR NICKNAME AS WELL	**Do you know who this person is?** YES....1 NO.....2 (>>NEXT PERSON)	**Do you know them personally?** YES....1 NO.....2 (>>NEXT PERSON)	**How is this person related to you?** RELATIONSHIP CODE	**How long have you known this person?** < 1 YEAR.....1 1-5 YEARS.....2 5-10 YEARS....3 10+ YEARS....4 ALL MY LIFE...5	**Would you consider this person to be...** NOT A FRIEND....0 ACQUAINTANCE....1 DISTANT FRIEND..2 GOOD FRIEND.....3 CLOSE FRIEND....4	**How often do you speak to this person?** DAILY.....1 WEEKLY.....2 ONCE OR TWICE.. A MONTH.....3 RARELY.....4 NEVER.....5	**Would you trust this person to look after a valuable item for you?** YES....1 NO.....2	**Have you ever received a gift (of money, goods or services) from this person?** YES....1 NO.....2	**Have you ever given a gift (of money, goods or services) to this person?** YES....1 NO.....2

Bottle cap drawn	Prize	
	With dot	Without dot
		Sorry, no prize
	GH¢10 chickens	GH¢10 cash
	GH¢20 chickens	GH¢20 cash
	GH¢35 goat	GH¢35 cash
	GH¢50 goat	GH¢50 cash
	GH¢70 goat	GH¢70 cash

Village	HHN	Respondent's name	ID Code	Date	Round	Enum. ID

LOTTERY PRIZEWINNERS FOLLOW-UP QUESTIONNAIRE

Complete a separate sheet for each person who won a prize in this round. Those who won multiple prizes should complete one questionnaire per prize.

A. General prize information

1. a. Type of prize won — CASH.....1 / CHICKEN(S)..2 / GOAT.....3 — [ ]

   b. Value — GHC — [ ]

   c. Where did you win? — LOTTERY.....1 (>>2) / LUCKY DIP...2 — [ ]

   d. Did you tell your spouse about the prize? — YES...1 / NO....2 — [ ]

2. a. Did you receive the prize personally? — YES...1 (>>B) / NO....2 — [ ]

   b. Who received the prize? — RELATIONSHIP CODE — [ ]

   c. Have they given the prize to you? — YES...1 / NO....2 (>>END) — [ ]

   d. When did they give it to you? — DATE (DD/MM/YY) — [ ]

B. Animal prizes

Did you win an animal prize? — YES...1 / NO....2 (>>C) — [ ]

1. Please describe what you did with the animal(s) you won.

   List all actions using a new line for each action. (Please aggregate multiple instances of the same action.)

	1. Animal no. (1 or 2)	2. Date (DD/MM/YY)	3. Action (ACTION CODE)	4. Proportion of animal (PERCENTAGE)	5. Comments (EG. SPECIFY FOR Q3)
a.					
b.					
c.					
d.					

ACTION CODES
KEPT.....1
SOLD (PART OR ALL)...2
ATE OR PREPARED AS FOOD.....3
GAVE AWAY.....4
LOST OR WAS STOLEN...5
OTHER (SPECIFY).....6

2. If you sold part or all of an animal you won, please describe the sales you made.

	1. Animal no. (1 or 2)	2. Date (DD/MM/YY)	3. Proportion of animal (PERCENTAGE)	4. Who was the buyer? (RELATIONSHIP CODE)	5. Money received (GHC)
a.					
b.					
c.					
d.					

3. If some of the animal meat was eaten or prepared for eating by your household, were any non-household members invited to share the meal?

	1. Date of meal (DD/MM/YY)	2. Name of invitee (PLEASE INCLUDE HHN IF APPLICABLE)	3. Relationship (RELATIONSHIP CODE)	4. Comments (EG. REASON FOR CELEBRATION)
a.				
b.				
c.				
d.				

4. If part or all of the animal (or its meat) was given away, to whom was it given?
   Include gifts to spouse(s).

	1. Date (DD/MM/YY)	2. Name (PLEASE INCLUDE HHN IF APPLICABLE)	3. Location (LOCATION CODE)	4. Relationship (RELATIONSHIP CODE)	5. Proportion (PERCENTAGE)
a.					
b.					
c.					
d.					

5. If you kept the animal(s), what do you plan to do with it/them? — EAT.....1 / USE FOR BREEDING..2 / SELL.....3 / GIVE AWAY.....4 / DON'T KNOW.....5 / OTHER (SPECIFY)...6 — [ ]

LOTTERY PRIZEWINNERS FOLLOW-UP QUESTIONNAIRE, Cont'd

C. Cash prizes

Did you receive a cash prize, or sell an animal prize?

YES...1
NO....2 (>>D)

Please describe what you did with the money.

List all actions using a new line for each action. (You may aggregate meals, sales etc.) Include amounts of money given to the respondent's spouse(s).

	1. Date DD/MM/YY	2. Amount GHC	3. Action SPENT.....1 PUT IN BANK/SUSU.....2 (>>5) INVESTED IN BUSINESS OR FARMING.....3 (>>6) GAVE AWAY.....4 (>>7) LENT.....5 (>>7) OTHER (SPECIFY).....6 (>> NEXT ACTION)	4. What did you spend it on? CONSUMPTION GOOD..1 ASSET (SPECIFY)...2 UTILITY BILL.....3 ENTERTAINMENT.....4 LIVESTOCK.....5 OTHER (SPECIFY)...6 (>> NEXT ACTION)	5. Type of account **BANK..1** **SUSU..2** **OTHER.3** **(>> NEXT ACTION)**	6. Please describe the business. Type of business OCCU-PATION CODE	 Item(s) bought (or services paid for) DESCRIPTION (>> NEXT ACTION)	7. Name of recipient (PLEASE INCLUDE HHN IF APPLICABLE)	8. Location LOCATION CODE	9. Relationship RELATIONSHIP CODE	10. Repayment date (if applicable) DD/MM/YY
a.											
b.											
c.											
d.											
e.											
f.											
g.											
h.											

D. Social interactions

1. How did your spouse(s) react to the news that you won?

HAPPY.....1
UNHAPPY.....2
NO REACTION.....3
DOESN'T KNOW I WON..4
OTHER (SPECIFY).....5

2. a. [For MALE respondents] In the week you won, did you give more chop money than usual because of the prize?

GAVE MORE.....1
GAVE THE SAME..2 (>>4)
GAVE LESS.....3
DON'T KNOW.....4 (>>4)

b. [For FEMALE respondents] In the week you won, did you receive less chop money than usual because of the prize?

RECEIVED LESS..1
REC'D THE SAME.2 (>>4)
RECEIVED MORE..3
DON'T KNOW.....4 (>>4)

3. How much more/less? (Give at least an estimate.)

GHC

4. In general, how did your friends react to the news that you won?

HAPPY.....1
UNHAPPY.....2
NO REACTION.....3
DON'T KNOW I WON....4
OTHER (SPECIFY).....5

5. Has anyone asked you for money or gifts *because* you won?

YES...1
NO....2 (>>END)

6. Please describe their requests. (Include requests from spouse(s) and other family members.)

	1. Name (PLEASE INCLUDE HHN IF APPLICABLE)	2. Relationship RELATIONSHIP CODE	3. What did they ask for? DESCRIPTION	4. Did you give it to them? YES...1 NO....2
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				

Script for Public Goods Experiment

Dialogue

As we promised, today we are going to pay you GHC2 for your participation in the survey in April. The payment is to compensate you for the time you spent helping us with our research.

Give the person GHC2 (10x 20p coins).

As we discussed at a village meeting recently, you have the choice to donate some or all of this money to a fund which will be used to purchase a [public good] for [your village]. This was the item the people at that meeting decided would be most useful for [your village]. The money we collect will be kept in a bank account until the end of the year and then used to buy the [public good].

In order to assist your village to buy the [public good], we will match the donations of a certain number of people. Please take a bottle top from this bag to find out whether your donation will be matched. *Show the ratio card to the person and explain which number they drew based on the colour of the bottle top.*

- ***If the number drawn was ½, 1, 1½ or 2*:** You have drawn the number [X]. *Show card with numbers and matching amounts for the ratio drawn.* That means that for any donation you make to the fund, we will make an additional donation of [X] times what you donate. For example, if you donate c1, we will donate an additional [X times c1]. *Answer any questions and ensure the person understands this concept before continuing.*

- ***If the number drawn was 0*:** You have drawn the number 0. That means we will not be able to match your donation. However, you are still welcome to donate to the fund if you like.

You can choose to donate **any** amount. You do not have to donate unless you want to. What you choose to do is entirely your decision, and will be kept private. We will not tell anyone outside this room whether you donated, and it will not affect your status in the survey or your chance of winning prizes in the lottery. Your donations are important, however. The village will only get as much money to buy the [public good] as is raised through respondents' donations and the matching contributions.

Would you like to donate, and if so, how much will you donate?

Take donation (if offered) and place in the susu box. Count out the matching donation and explain the calculation. Place the matching donation in the box as well. Thank the person for their time and kind donation, and show them to the door. Once they have left, record the amount they donated on the form.

Actions after donations

After the donations are complete, we will open the box and count the money in the presence of the village chiefs. We will record the amount raised and announce it to them. We will explain that the money will be kept in a bank account until the end of the year, and then the total raised will be spent on the item they chose.

Script for possible questions, complaints

1. *Difficult villagers*. Give pretest participants a c1 note if they ask for it (provided they are identified). They must sign in as respondents do. They are not to continue to the experiment, however. Those who were neither in the sample nor the pretest are **not** to be paid under any circumstances.

2. *Proxy recipients*: The money is to be given **only** to the respondent him/herself. Respondents may **not** accept the money on behalf of their spouse. We will revisit absentees when they return.

3. *Dropped households.* Individuals whose households were dropped (in Konkonuru and Darmang) are **only to be paid if they completed both the household questionnaire and social network questionnaire**. In that case, give them a c1 note and ask them to leave. Don't continue with the experiment. Those who did not complete both questionnaires have not earned payment and are **not** to be paid. If the wife completed the questionnaires but the husband didn't, pay her but not him. In all cases, explain that because their household is no longer in the survey, they will not be paid again and will not take part in the lottery.

4. *I don't want the money.* If anyone refuses payment, it constitutes a full donation. Make this known to the respondent too. Continue with the experiment to determine the matching donation.

5. *Respondent refuses to take part in experiment*. The respondent has the right to leave at any time. Pay them their money and ensure they have signed for its receipt. Record the donation as zero in such circumstances.

6. *You didn't give me enough compensation for my time.* Paying respondents for surveys is not common. We are giving you a small amount of money in gratitude for your time, but are operating on a limited budget and this is the most we can offer.

7. *I don't like the match, I want to draw again.* Sorry, you cannot. The matching draw is final. If you were offered a different match ratio to a friend or spouse; this is intentional. You should make your own decision about donating based on the match we have offered.

8. *I want to donate more than c1*. We will accept larger donations, but can only afford to match up to [X] cedis (where X is the match proportion offered). Take the larger donation, record it on the form and put it in the box along with X cedis. Record X cedis on the form as the matched donation, and X as the match proportion.

9. *What happens to the money?* It will be counted in front of the assemblyman or chief, and kept in a bank account until December, when we will use it to pay for the village public good.

10. *I don't agree with the public good chosen*. The public good was decided by a village meeting with the leaders of the village present. As a village you may change your mind about the good later in the year, but only if everyone agrees. We are trying to offer your village something that is needed, and that a majority of people want. It is impossible to satisfy everyone, or buy everything that is needed.

11. *Any other questions?* **Do not improvise**. Call Thomas on 0245 927 606 for directions.

Bottle cap	Match ratio
	0
	½
	1
	1 ½
	2

Darmang

Project: Complete the JSS building.

Raised so far: GH¢ 276

Required for project: GH¢ 750